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MODERN SURGICAL PROCEDURES FOR LESIONS OF THE COLON AND RECTUM*

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In the not too distant past surgical removal of a lesion of the colon or rectum was accomplished routinely by multiple procedures. This necessitated prolonged hospitalization. The control of a group of factors newly appreciated during the last decade have permitted a change in this attitude so that modern operations for colon and rectal lesions usually involve a very short hospital stay and a short period of morbidity. Furthermore, the risk of operation has been reduced even though stage procedures now may largely be eliminated. Formerly preliminary colostomy was a procedure of choice prior to rectal resections; and preliminary cecostomies, or so-called defunctioning colostomies, were considered proper prior to removal of other lesions of the large bowel. Now these stages of operations are almost entirely obsolete.

Among the factors which have changed advanced surgical thought in this field are the following. First, altered fluid and chemical balance of the blood. Measures may be taken in the preoperative preparation to obviate variations from the normal. It is now known that frequently patients with carcinoma have dehydration and altered blood chemistry, low blood protein, avitaminosis, diminished erythrocyte count. These features which influence the risk of operation may be corrected to a relative normal in the preoperative phase by administration of transfusions, amino acids and vitamins. Secondly, it is absolutely essential that the bowel be prepared. Optimum preparation of the large bowel for operation means highest obtainable emptyness. To attain this it is essential that the patient be fed a non-residue diet for a period of at least 48 hours immediately preceding operation. This tends to create further protein deficiency which must be combatted by parenteral administration of protein. It is a mistake to feed a patient right up to the time of operation with the intended motive of retaining normal blood proteins. What is gained in chemical balance is lost by the insecurity of not having an empty colon at the time of operation. It is much more important to have the bowel empty and for this reason it is imperative that replacement of the lost protein due to diminished diet in this immediate preoperative phase, be made by the intravenous route.

Chemotherapy is another important advance. One has the choice of administering poorly absorbed sulfonamide (succinylsulfathiazole, sulfathalidine) with the hope that it will diminish the bacterial content of the colon and thus reduce the risk for operation. In the past we have employed these drugs in a desultory manner with no real conviction of their efficacy. Finally

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it has been discarded from our routine with the belief that it is inconsequential in the preparation of the patient, and we shall not revert to its use until more convincing evidence of its value is published in the literature.

Other types of chemotherapy have played a tremendous part in reducing mortality for these operations. Penicillin, particularly, protects the patient against contamination and peritonitis. It is our routine to start the administration of penicillin the night before the operation. Following the operation penicillin is administered intramuscularly and sulfadiazine intravenously.

Other important factors in the success of this type of surgery involve the support of the patient's general condition during the operation by administration of whole blood. Equally important is the selection of an anesthetic which will not add to the patient's burden and which will permit the surgeon to work with greatest ease and with least trauma to the patient. Spinal anesthesia is the optimum anesthetic for this type of surgery.

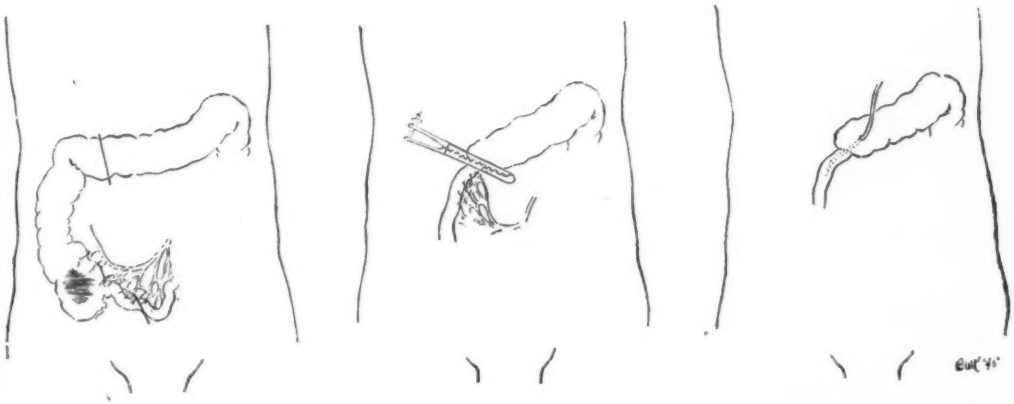
The diagnosis of carcinoma of the colon and rectum is so important that it would not be proper in a paper on operative procedures for lesions of these organs, to omit entirely some word regarding important features in the diagnosis. The symptoms and objective findings of carcinoma of the large bowel and rectum may be separated into three main groups depending on where the lesion is located. Carcinomas of the cecum and the first portion of the ascending colon rarely produce complete obstruction. They may subjectively result in crampy pain, but weight loss, anemia and objective evidence of a mass, together with the roentgenographic evidence of a lesion are the important features in establishing a diagnosis. Lesions elsewhere in the colon down to the rectum proper are apt to produce obstructive symptoms—and bleeding. With or without objective findings of a mass and distension, but with proof by retrograde barium enema of the existence of a filling defect, the diagnosis may be established. Lesions of the sigmoid and descending colon may bleed as an initial symptom but they frequently produce obstruction without other signs. An early carcinoma of the rectum never obstructs. Small carcinomas of the recto-sigmoid obstruct but carcinomas of the rectum must be huge to produce obstruction. The ampulla of the rectum is so large it will accommodate a considerable growth without compromising the lumen to the extent of obstructing. The patient does not have obstructive symptoms, he does not have constipation unless the growth is huge and the symptomatology unduly prolonged. Patients have, early, the sensation of incomplete evacuation of the bowel and that there is something there that cannot pass. Bleeding is the most common, single symptom of carcinoma of the rectum. Eighty per cent of carcinomas of the recto-sigmoid and rectum cannot be touched by the finger on digital examination. If the growth is in the ampulla between the recto-sigmoid and the lower end of the rectum, the finger may gain the sensation that there is a mass even though the lesion may not be actually touched by the finger. It is well worth knowing that a carcinoma of the rectum is not disclosed by a barium enema. Carcinomas of the recto-sigmoid and sigmoid and the remainder of the colon may be disclosed by a barium enema, but the rectum itself is such a large space that a filling defect from a small growth on the posterior or interior surfaces is usually overlooked by roentgenologists. Diagnosis of carcinoma of the rectum must be made by proctoscopic visualization and by biopsy of the lesion. The fact that there is a segment of the rectum whose diagnostic domain is that of the proctoscope only, is not sufficiently appreciated.

Review of our operations on the colon and rectum for the years 1943 through April, 1946, inclusive, showed 33 resections of the colon and rectum. Thirty-one of these procedures were primary resections without preliminary colostomies. Two resections were done after preliminary colostomies. One of these preliminary colostomies was made because of obstruction by a lesion of

a descending colon. The other preliminary colostomy was an elective one, preceding an abdomino-perineal resection of the rectum. This was done in January, 1943, and is the first case in this series, the last case in which an elective preliminary colostomy was performed. Thirty of these procedures were done for malignancies; three were done for benign lesions; one granuloma of the cecum, two obstructive lesions of the transverse colon resulting in segmental megalocolon proximal to the obstruction. Six right hemicolectomies were done and four segmental resections of the transverse, descending colon and sigmoid. All of these were primary resections with immediate end to end anastomoses. All of these anastomoses were made aseptically usually by employing a Furniss clamp. Even in resection of the terminal ileum and right hemicolon an end to end anastomosis was made. Under these circumstances Witzell type enterostomy was employed. The catheter was inserted in the colon 6 centimeters distal to the anastomosis and the enterostomy catheter was passed cephalad into the proximal segment (figure 1). This insured decompression of the proximal segment just above the suture line and was proof positive that the anastomosis was patent. In doing segmental resections of the colon an enterostomy is made with this arrangement of the enterostomy catheter. This catheter removed on the tenth or twelfth postoperative day may be used prior to that for installation of oils to facilitate passage of intestinal contents through the anastomosis.

There were 23 resections of the rectosigmoid and rectum in this group. In 10 instances primary anterior resection of the rectosigmoid or the rectum was done with anastomosis of the sigmoid to the rectal stump. In addition to that in five instances in which the growth was too low to reestablish continuity after resecting the rectum anteriorly an abdominoischeal resection previously described by the senior author[1] was performed. In this operation after mobilizing the rectum anteriorly and dropping it into the pelvis as in an abdomino-perineal resection, it is removed through an incision in the ischeal fossa and the sigmoid is brought down and anastomosed to the stump of the rectum just above the anal canal. It is questionable whether this operation is going to be justifiable. Growths this low are so near the sphincter that preservation of the sphincter may not be feasible without increasing the danger of recurrence.

In eight instances abdomino-perineal resections were done. This group contains the earlier cases of those reported herein and undoubtedly a few of those would be done today by an anterior resection with reanastomosis.



1 Lesion and area resected 2. Anastomosis with Furniss clamp 3. Catheter enterostomy retrograde and transanastomotic

There were three deaths in the entire series, one a woman age 76 who died on the

table following resection of the cecum and ascending colon and anastomosis. This we felt was an anesthetic death since there was a sudden irreversable apnea when the spinal anesthesia was supplemented by general inhalation anesthesia at the termination of the operation. One patient, aged 32 years, following resection of the rectum with re-anastomosis, died on the fifth postoperative day. The findings were generalized peritonitis. The third death was due to hemorrhage following abdomino-perineal resection in an extremely obese female. In the group of 15 patients in whom continuity was re-established after resection of the rectum there was one death mentioned above.

There is a great debate in the literature on whether conservative operation should be done for cancer of the recto-sigmoid and rectum. In the operation described by Dixon the upper segment is removed just as radically as is the removal of this same segment in abdomino-perineal resection. Indeed that part of the operation is identical with abdomino-perineal resection. In those instances, however, in which the continuity is re-established the distal part of the procedure is less radical. Numerous studies are being shown including those of Gilchrist and David;[2] and Coller, Kay and McIntyre;[3] and Waugh[4] which demonstrated significant distal spread of cancer of the recto-sigmoid and rectum in only 2 to 3 per cent of all resected specimens. In the group in which distal metastases were found lymph nodes proximal to the lesion were so obstructed that it became apparent that the cause of the distal metastases is due to retrograde flow of lymph induced by obstruction of nodes in the normal direction of flow.

The risk of operation for anterior resection and anastomosis is probably about the same as abdomino-perineal resection. For both operations it should be extremely low in a sufficiently large number of patients. Recurrence rate has yet to be proved. Only the series of Dixon[5] and of Babcock and Bacon[6] are sufficiently large to have a definite value for comparison of three years' cures between the results of abdomino-perineal resections and more limited resections with preservation of the sphincter. The results published so far indicate that the recurrence rate is just as low after preservation of the sphincter in those lesions which are above the distal 8 to 10 centimeters of the rectum, as it is following abdomino-perineal resection for a similar group of cases.

Numerical considerations are not the only ones. The number of lives saved at the time of operation will be one of the definite determinants for the choice of operation; but other things are to be considered. People who are left with a permanent colostomy are not restored to normal life. Those in whom the continuity is restored by an anterior resection have good function of their sphincters and are restored to normal bowel function. It is not likely that for the higher lesions of the rectum and recto-sigmoid there would be any greater recurrence from the one operation or the other. But if there were a slightly greater chance of recurrence following restitution of normal continuity it may be justified on the grounds that many of the patients who are saved with colostomies are broken in spirit and morale to such an extent that in reality they would be more fortunate to have lost at the time of their operation. Forty people saved without a colostomy may be worth 50 people saved with permanent colostomy.

SUMMARY

We reported a group of 33 resections of the colon and rectum, 31 of which were done in one stage without preliminary colostomy. There were three deaths, one following resection of the ascending colon, one following abdomino-perineal resection. Attempts to reestablish continuity were made in 15 of the 23 cases of cancer of the recto-sigmoid and rectum. One only of these patients died.

We prefer single stage operations for lesions of the colon and rectum and restitution of normal continuity following resection of the recto-sigmoid and rectum for lesions at least 8 centimeters above the ano-

cutaneous line. This will comprise 80 per cent of the cancers of the recto-sigmoid and rectum.

LEGEND FOR FIGURE ON PAGE 315

Fig. 1. Type of primary resection for carcinoma of the cecum or ascending colon. Following right hemicolectomy an end to end aseptic anastomosis is made. The ileum is cut obliquely to correct its adaptation to the colon. A catheter enterostomy is made with the catheter entering the colon and passing through the anastomosis into the proximal segment. The catheter is removed in about ten days.

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TREATMENT OF CHOLEDOCHOLITHIASIS WITH INTRADUCTAL INJECTIONS OF ETHER

CASE REPORTS

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The technical difficulty involved in dislodging common duct calculi is well known to all surgeons who are familiar with biliary operative procedures. The experience of being unable to dislodge a common duct stone or of overlooking one (or more) when performing choledochotomy is not uncommon and is an admitted experience of a large number of reputable abdominal surgeons.

There are many contributing factors which often cause choledochotomy to tax the skill of the best surgical technicians. The patients are often markedly adipose. Extensive inflammatory changes (exudate, edema, adhesions, and so on) are often present in the region of the gastro-hepatic omentum. Anomalies of the ducts and blood vessels are relatively common. The patient's general condition may sometimes be such that prolonged operative procedures are contraindicated. Occasionally, common duct calculi are situated in diverticuli of the wall of the duct and choledocholithotomy is extremely difficult.

In some cases, mobilization of the duodenum to expose the retroduodenal portion of the choledochus as well as the procedure of transduodenal exploration of the terminal portion of the common duct may even prove unsuccessful.

It is, therefore, logical that the use of various chemicals in the form of common duct irrigation partially to dissolve the stones and cause them to be extruded into the duodenum has been conceived and successfully used on numerous occasions.

Any substance so employed must fulfill two important requisites: (1) the substance must have a solvent action on the stone; (2) it must also be innocuous to living tissues.

Various chemicals have been used for common duct irrigation. Ether,[6] turpentine,[7] ether-glycerine mixture,[6] ether-alcohol mixture,[6] and recently chloroform,[3] have all been used with varying success. Ether has been more widely used than any of the other mentioned chemicals and is generally accepted to be the most ideal substance for irrigation of the choledochus to remove calculi.

Pribram,[4] Walters and Wesson,[6] Burgess,[2] Boyce[1] and others have agreed on the safety and efficiency of ether in the dissolution of common duct calculi.

The solubility of cholesterol, bile pigments and bacterial and cellular debris (all components of gall stones) in ether is an accepted chemical fact. Although the degree of solubility is slight, it is sufficient to diminish the size of the calculi to such an extent that they will eventually pass into the duodenum.

Raffi,[5] has shown experimentally in dogs

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that repeated ether injections are relatively harmless to the common duct mucosa. These injections were carried out over much longer periods of time than are used in the treatment of actual human patients.

Recently, Narat and Cipolla[3] have advocated common duct irrigation with warm chloroform for the dissolution of stones. It is indisputable that chloroform is a more potent solvent for biliary calculi. However, chloroform is a well known hepato-toxic agent and more careful animal experiments are necessary before chloroform can be injected into the human choledochus with any degree of impunity.

TECHNIC

If postoperative cholangiography reveals the presence of a residual common duct stone, injection of the duct with ether should not be undertaken until the following four conditions are fulfilled: (1) The patient is afebrile; (2) the operative wound is well healed; (3) icterus index is within normal limits; (4) liver function has returned to or remains within normal limits (as indicated by the cephalin flocculation and other liver function tests).

The T-tube and common bile duct should first be irrigated with normal saline and then aspirated. The patient is given a hypodermic injection of amyl nitrite. Immediately following this, 3 to 5 c. c. of ether are injected into the T-tube and the tube is pinched off until the patient complains of severe pain. At this time, the tube is immediately released and the excess ether is allowed to run back out of and evaporate out of the open end of the T-tube.

This procedure should be performed twice daily for a period of five to seven days. After this time, cholangiography should again be performed to see if the stone has passed into the duodenum.

If the above technic has been carried out and after five to seven days the stone is still present in the common duct, it is highly improbable that further irrigations will be successfull and secondary choledochotomy is indicated.

CASE NO. 1

Mrs. T. C., a white female, aged 51, had indigestion and upper abdominal pain for three years. These symptoms were particularly aggravated by the eating of fatty foods.

For three weeks prior to admission, she had severe pain in the right upper quadrant and jaundice. Typical biliary colic had occurred on several occasions. The stools were clay colored. She had fever up to 103° and had experienced severe chills.

Physical examination revealed marked tenderness in the upper right quadrant, but there was no palpable mass. The icterus index was 120. A gastrointestinal series was negative for duodenal or pancreatic pathology.

At operation, cholecystectomy and choledochotomy were performed. The common duct was explored both transduodenally and from above. Six small calculi of mixed variety were removed from the choledochus. The duct was probed without difficulty into the duodenum and the sphincter of Oddi was dilated. A T-tube was left in place in the common duct.

On the tenth postoperative day, cholangiography revealed the presence of a stone at the ampulla. The duct was incompletely obstructed and the stools were normal in color (Fig. 1).

Fig. 1. Cholangiogram showing calculus in region of ampulla remaining after choledochotomy.

Ether injections were begun and carried out daily for five days. The above technic was used. Cholangiography was performed subsequent to the ether

irrigations. The stone was found to be no longer present and the duct was unobstructed (Fig. 2).

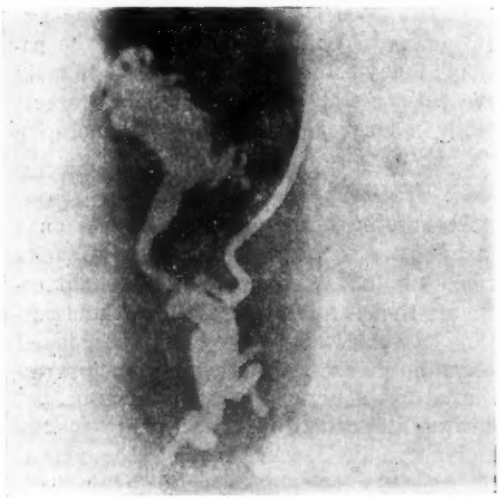

Fig. 2. Cholangiogram following ether irrigations showing calculus no longer present.

The patient at the present time is in excellent health and has had no recurrence of biliary symptoms.

CASE NO. 2

Mrs. S. L., a white female, aged 40, had had recurrent attacks of right upper quadrant pain, nausea and vomiting for the past two years. Indigestion was caused by fatty foods. Several severe attacks of pain and jaundice had occurred. The jaundice had subsided spontaneously on each occasion, but had been persistent after the most recent attack. The patient had had no chills and at no time had experienced high fever.

Physical examination revealed tenderness in the epigastrium and upper right quadrant. The icterus index was 40. The gastrointestinal series was negative for duodenal or pancreatic pathology.

After preoperative preparation, operation was performed. Cholecystectomy and choledochotomy were performed. Two small calculi were removed from the common bile duct. The duct was irrigated, the sphincter of Oddi was dilated, and a probe could be passed without difficulty into the duodenum.

On the eight postoperative day, cholangiography was performed. It was found that a defect was present in the ampulla, causing incomplete obstruction of the common bile duct. This shadow was characteristic of that caused by a calculus.

Ether irrigations, carried out daily for four days according to the above technic, were again successful in dislodging the stone.

The patient is well at the present time and has had no recurrence.

COMMENT

Two cases of multiple common duct calculi are herein reported. In each case, it was believed that adequate choledochotomy had been performed. Subsequent cholangiography revealed the presence, in each case, of a stone lodged at the ampulla, which had been missed at operation. In both instances, the stones were causing only incomplete obstruction of the duct and might have been overlooked if cholangiography had not been performed.

Ether irrigations, according to the technic described herein, were successful in dislodging the calculi.

It is to be noted that such calculi causing incomplete obstruction may be entirely asymptomatic and the stools may be normal in color. However, recurrent complete obstruction of the choledochus is inevitable in such cases. Therefore, cholangiography should always be performed after choledochotomy, regardless of the normal appearance of the stool, the absence of symptoms, and the diminution of the degree of jaundice.

Furthermore, in such cases of choledochus calculi producing incomplete obstruction, if the T-tube is removed, the remaining biliary fistula may close. Thus, the surgeon may have a false sense of security and believe that the common duct is entirely free of calculi.

The exact *modus operandi* by which ether irrigations are successful in removing common duct calculi is worthy of discussion. The solubility of the various components of biliary calculi in ether is not sufficient entirely to explain the success of ether irrigations in such cases. It is entirely possible that the marked irritation of the ether and the increased intrabiliary pressure produced by evaporation of the ether cause a propulsive reflex action in the common duct which may have something to do with the calculi being expelled into the duodenum.

SUMMARY

1. The removal of common duct calculi requires the highest degree of operative skill.

2. Common duct calculi are frequently

overlooked when choledochotomy is performed.

3. Cholangiography should always be performed before a T-tube is removed from the choledochus.

4. Numerous chemical substances have been advocated for common duct irrigation in order to remove calculi.

5. Ether, experimentally and clinically, has been reported to be safe in the removal of common duct calculi.

6. Two cases are herein reported in which common duct calculi were overlooked during the procedure of choledochotomy and cholecystectomy.

7. In each instance, the calculi were successfully removed by irrigations of the duct with ether.

8. The importance of performing cholangiography after choledochotomy is stressed.

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ESSENTIAL FACTORS IN PREOPERATIVE, OPERATIVE, AND POSTOPERATIVE CARE OF GYNECOLOGICAL PATIENTS*

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When the gynecological patient is to undergo an operative procedure the physician in charge should be certain nothing is overlooked that might compromise the patient's chances for a successful outcome.

It has been said that a generation ago surgery was being made safe for the patient; today efforts are being made to make the patient safe for surgery. The progress made in surgery during the past generation has been mainly in the field of pre and postoperative care.

In observing the care of patients on a large gynecologic service at the Charity Hospital in New Orleans, the thought occurred that it might be of interest and possibly of some value to review in a general way and to emphasize certain factors essential to the care of these patients before, during, and after surgery. The present low mortality and low incidence of complications postoperatively observed at this institution are due to the adherence to certain criteria based on sound surgical principles.

POSTOPERATIVE CARE

The late John Polak,[1] in a paper entitled "What Can We Learn From a Study of Mortalities?" observed that perhaps three-fifths of the deaths following his own elective gynecologic surgery might have been prevented by stricter adherence to the criteria which he had set forth. The late Hilliard E. Miller,[2] in an analysis of 154 deaths associated with benign gynecologic disease, stated that 73 of these were possibly preventable had such avoidable errors as; (1) inadequate investigation; (2) poor preoperative preparation; (3) poor or delayed or inadequate postoperative therapy; (4) lack of alertness in detecting postoperative complications in their incipiency; (5) uncorrected anemia; (6) prolongation of the operative time and excessive blood loss at operation; and (7) a general tendency to underestimate the possible risk, been appreciated by the attendants. Williams,[3] in a recent discussion of mortalities following excision of the uterus, states that he had the minimum preoperative requisites posted at the intern's desk on his gynecologic service in the Philadelphia General Hospital, and that he tried to have it followed. These requisites for all elective sections are:

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1. A complete history and general physical examination.
2. A leukocyte count of between 7,000 and 10,000.
3. A polymorphonuclear percentage of from 65 to 80.
4. A sedimentation time within normal limits.
5. A normal urinalysis, and an adequate kidney function.
6. A temperature of 98.6°F. for at least 48 hours before operation.
7. A systolic blood pressure between 110 and 150.
8. A negative Wassermann test.
9. Rest in bed in the hospital for a period of at least 48 hours, during which time the intake of fluids (water, milk) must be at least two and one-half quarts per diem, while the usual sugar intake of the individual must be at least quadrupled.

Williams, in studying Polak's report of his mortalities, was impressed by the fact that the fatal issues were attributable in high proportion to omission or misinterpretation of history, to omission or inadequacy of physical examination or of laboratory procedure, or to disregard of some other important preoperative requisite.

Many weeks prior to elective surgery, the candidate should have all obvious foci of infection eradicated that can possibly be removed. Certain postoperative complications such as pyelitis and intravascular clotting are believed to be due in some instances to foci of infection in the teeth or tonsils, and might have been prevented by removing these foci before operation. Any patient over 40 years old should be given the most thorough examination of heart, lungs, liver, and kidneys; any abnormalities encountered should be given the benefit of consultation with an internist. An electrocardiogram should be routine in this age group. Elderly patients present an increased incidence of disease of these organs and since operative procedures add a considerable strain on the heart in particular, any degree of incompetency, however mild, may lead to serious trouble at the time of operation. Further, elderly patients should not be kept in recumbent position for long periods of time, but should be encouraged to moderate activity with intervals of rest. Latent, subsiding or quiescent respiratory disease may flare up following anesthesia of the inhalation type. A routine appraisal of the urinary system should include a catheterized specimen for urinalysis, P.S.P. and Fishberg concentration tests and blood chemistry to detect any degree of renal impairment. Disease of the liver should be looked for, utilizing the various hepatic function tests available (cephalin-cholesterol flocculation test and Quick hippuric test). When these tests indicate impaired liver function, intensive glucose therapy before and after surgery is indicated to improve liver function and spare this organ postoperatively. The use of decholin in addition has also been advocated. That glucose alone is not enough in these cases but protein is of equal or more value, to potentiate natural hepatic resistance is now being realized.

The value of adequate nutritional preoperative preparation, especially in patients who have sustained recent large weight losses, is recently stressed in an excellent article by Varco.[5] He states: "There is a broad zone existing between optimal nutrition and classical deficiency states in which abide many borderline cases of unsatisfactory dietary management and/or inadequate food intake." Adequate hydration, restoring of electrolyte balance, and adjusting the hemoglobin values by transfusion are not enough in patients who may also present a fatty liver and heptic dysfunction associated with, hypoproteinemia caused by malnutrition. These patients tolerate prolonged surgical manipulations, or even minor ones occasionally, poorly and may have a stormy convalescence or worse postoperatively. Varco has shown that such patients may be prepared satisfactorily for operation by feeding of high protein, carbohydrate, caloric, low fat diet.

We do not like to subject a patient to extensive surgery who has a red count of three and one-half million or less, or a hemoglobin of 70 per cent or less, unless

this patient is transfused preoperatively. All subjects should have hematologic study, including the white and differential count, coagulation and bleeding time and a determination of the Rh factor. Any woman who is a Rh negative should receive of course only Rh negative blood if transfused. Typing and cross-matching is routine preoperatively and 500 c. c. of compatible citrated blood should accompany the patient to the operating room in all cases of major surgery, even if the blood count is normal. As stated above, the sedimenation rate and white count ideally should be within normal range before elective surgery; however a thorough bi-manual pelvic examination which does not excite a rise in temperature above normal is probably of more value in predicting whether the patient will have a stormy postoperative course or worse.

Particular attention should be given to obese subjects, in general poor candidates for operation. They are prone to develop pulmonary complications, acidosis, and wound infections. In addition, the technical difficulties at operation are much greater. If at all possible the obese woman should be placed on a weight regime.[6]

It has been noted that cases presenting large pedunculated submucous fibroids or polyps, partially blocking the cervical canal and obstructing drainage, are all actively or potentially infected. These growths should be removed vaginally, infection cleared up and hysterectomy delayed several months. Cases of this type are usually infected with a virulent type of streptococcus and hysterectomy is dangerous in their presence. Before this was recognized, fatalities due to this had been reported.

In all suspicious cervical lesions routine biopsy should be done before major surgical work. Early cervical carcinoma can be diagnosed only in this manner. Where biopsy reveals carcinoma, irradition, and not hysterectomy, would of course be the procedure of choice. All abnormal uterine bleeding near and particularly after menopause should be curetted for possible carcinoma before doing hysterectomy, because in carcinoma of the body of the uterus, preoperative irradiation followed by hysterectomy gives better results than either alone.

Before hysterectomy, all infected cervices should be cleared of as much infection as possible by douches, cauterization and other local treatment; otherwise an increased morbidity and mortality is to be expected. Estrogenic vaginal suppositories will facilitate plastic procedures on the vagina and combat local infection in cases presenting post menopausal atrophy of the mucosa. Preoperative administration of adrogens may make the surgical treatment of extensive endometriosis easier by causing regression of these abnormal growths. Cases presenting third degree lacerations of the perineum or recto-vaginal fistulae are best perpared by a non-residue diet and sulfasuccidine orally for a few days. Plastic procedures are best delayed until thorough involution has taken place following parturition, usually about three months. Exceptions to this rule are third degree lacerations and episiotomies that have broken down following initial repair at delivery.

All women to have vaginal surgery should have a series of acid douches perioperatively. All cases of vaginal or abdominal surgery are given a 1-10,000 potassium permanganate douche the night before and the morning of the operation and each douche is followed by the instillation of two ounces of a 4 per cent mercurochrome solution into the vagina. The bladder should be emptied by the insertion of a soft rubber catheter one hour before operation and it is taped to the thigh for continuous drainage, being left open during the operative procedure. One at times will see the abdomen opened for some pelvic surgical procedure in the presence of a half-filled urinary bladder, which may necessitate catheterization, interruption of the surgical procedure and loss of valuable time. The half-filled bladder may also be injured while making the usual suprapubic incision. All cases scheduled for vaginal surgery should also be prepared for a laparotomy because an emergency may arise necessitating entry into the abdomen for the control of hemorrhage or other complications.

A uterus may be punctured in performing a simple curretage and inaccessible bleeding may occur during a vaginal hysterectomy. Ureteral catheters should be inserted preoperatively in all cases presenting pelvic lesions which may displace the ureters and subject them to injury.

OPERATIVE TECHNIC

In choosing an anesthetic, each case must be considered individually. In general spinal should be reserved for the younger age group with normal cardiovascular systems. Most deaths from spinal anesthesia are circulatory in origin. It should not be selected in cases presenting extremes of blood pressure, that is, marked hypotension or hypertension, cardiac disease or advanced age or for patients with conditions associated with increased abdominal tension, such as pregnancy, ascities or large pelvic tumors. It is also contraindicated in cases of hemorrhage. Cyclopropane also should be used only in patients of the younger age group having normal cardiovascular systems. It is of especial value in cases of shock due to ruptured ectopic pregnancy. The injection of parasympathicomimetic drugs particularly pituitrin during cyclopropane anesthesia is to be avoided as fatalities have been reported.[7] Intravenous pentothal, in spite of its convenience in short procedures, is a dangerous drug presenting too narrow a margin between a therapeutic and lethal dose to recommend it for general use. Excessive uterine bleeding may be encountered in using it for anesthesia when doing a currettage for incomplete abortion. Ethylene and ether is still the anesthesia of choice in hypertension, cardiac disease and in the elderly. Were it always practical, the local infiltration of novocaine is near the ideal in so far as risk to the patient is concerned. Unfortunately it is not applicable in the majority of cases. In summary, all anesthetics are safest when administered by trained physician-anesthetists familiar with all indications, contraindications, and able to prevent or combat anesthetic complications, as they occur. In shock elevating the legs at right angles to the body is the simplest and most effective way of raising blood pressure quickly.[8]

While preparing the abdomen care should be exercised that an excess of ether, tincture of merthiolate, or whatever preparation is used, does not pool beneath the buttocks and back causing burns. This, combined with the forcible jerking of sheets or a Kelly pad beneath the patient, causes considerable skin damage.

An infusion of 5 per cent glucose is usually started after the patient is anesthetized. It is much better to have the needle in the vein when the blood pressure is adequate than to wait until the patient goes into shock, as collapsed veins are difficult to find. Citrated blood may be added as needed through the same apparatus.

Adequate abdominal incisions give better exposure and facilitate the operative procedure. Prevention of excessive blood loss, gentle handling of abdominal viscera, avoidance of undue trauma in the use of packs and retractors all help in the prevention of shock, postoperative distention and adhesions. Prolonged operations are associated with an increased incidence of complications and the procedure should be as short as circumstances allow. Routine appendectomy at the time of extensive pelvic surgery should not always be done as an increased mortality will result. Expression of air from the abdominal cavity as the peritoneum is being closed may help minimize postoperative discomfort and distention.

Postoperative care begins before the patient leaves the operating room. Approximately half of all anesthetic deaths occur in the immediate postanesthetic period, usually from asphyxia due to aspiration of vomitus, premature removal of intra-tracheal catheters, "swallowing of the tongue," or laryngeal spasm. The anesthetist should watch the patient closely until all reflexes have returned and the possibility of such complications has passed. The patient should also be closely watched after returning to her room by an experienced nurse until completely reacted. The blood pressure should be checked every half hour for

three hours and shock therapy instituted if it falls to 90 or below systolic.

PREOPERATIVE CARE

We no longer, as in former years, purge the patient preoperatively and starve her postoperatively, resulting in the patient coming to and leaving the operation dehydrated and malnourished. Uncomplicated cases should get 2,000 to 2,500 c. c. of parenteral fluids during the first postoperative 24 hour period. Complicated cases (sepsis) require more (table 1). Tap water in small amounts, after nausea has subsided, may be given and deducted from the total fluid requirement. If abnormal losses are occurring they should be added as the amounts stated may be entirely inadequate.

TABLE 1

DAILY WATER REQUIREMENTS

Uncomplicated Case			
For vaporization	1,000 to 1,500		c.c.
For urine	1,000		c.c.
Total	2,000 to 2,500		c.c.
Complicated Case (Sepsis)			
For vaporization	2,000		c.c.
For urine	1,000 to 1,500		c.c.
Total	3,000 to 3,500		c.c.

In cases of dehydration as evidenced clinically by a hot, dry skin, dry tongue, fever and a scanty urinary output, an amount of fluids sufficient to maintain body fluids is not enough—an additional amount is necessary to provide for fluids previously lost (table 2). This large amount naturally would not be given during the first 24 hours and caution is necessary with old patients and those with cardiac deficiency. If

TABLE 2

WATER REQUIRED FOR A DEHYDRATED PATIENT WEIGHING 60 KG.

Water for vaporization	2,000	c.c.
Water for urine	1,500	c.c.
Any abnormal loss	Variable	
Water to restore depleted fuilds (6 per cent of 60 kg.)	3,600	c.c.
Total	7,100	c.c.

the rate of administration be approximately 200 c. c. per hour and this is on a 24 hour basis by continuous intravenous drip the volume required is given.

The average patient needs 5 to 6 grams of salt daily and 1,000 c. c. of normal saline solution contains 9 grams. Excessive administration of saline solution will produce salt retention and edema. Abnormal losses of fluids and electrolytes from vomiting, diarrhea, gastric and duodenal suction, intestinal obstruction, fistulae, shock, may occur. Fluids removed by gastric suction should be replaced volume for volume by saline solution (normal) or Ringer's solution. In cases of low plasma chlorides the giving of 0.5 grams of salt per kilogram of body weight for each 100 mg. that the plasma chloride has to be raised to reach the normal (560 mg. per cent) is a useful formula. Glucose, 5 per cent, is added to distilled water to make up the fluid requirements after providing for the electrolytes. One-sixth molar sodium lactate solution is indicated in severe acidosis. One-half is converted to liver-glycogen while the other half is oxidized to bicarbonate. This may be combined with Ringer's solution.

Hypoproteinemia may occur postoperatively being evidenced by peripheral and visceral edema, diminished intestinal motility and poor wound healing. The serum albumin range is 3.5 to 5.5 grams per cent while that of globulin is 1.5 to 3.5 grams per cent. The total serum protein averages 7.36 with a range of 6.2 to 8.1. Palpable edema is said to occur when the total serum proteins fall below 5.5 grams per cent or the albumin fraction below 3 grams per cent. Amino acids (amigen or parenamine) orally or parenterally may be used in an attempt to restore tissue proteins, plasma is indicated to restore serum proteins. However, as said previously, hypoproteinemia is better corrected preoperatively, if possible, by dietary means. Vitamins are necessary for patients receiving only intravenous alimentation and thiamin chloride 100 mg., nicotinic acid 50 mg., riboflavin 5 mg., and cevitamic acid 500 mg., may be added daily to infusions. Hypoproteinemia and a lack of vitamin C causes poor wound healing.

Normal cases postoperatively are usually able to take adequate fluids orally after the first 24 hours; however any deficit should be given parenterally. Few patients

will take an adequate amount however, unless urged to do so at regular intervals by the attendants. The total fluid intake and urinary output should be accurately measured and charted on a separate sheet and added up every eight hours thereby giving at a glance this vital information. A soft diet is usually tolerated on the third postoperative day and a full on the fourth. Mineral oil is started at this time and an enema given on the fourth postoperative day in the usual case. A non-residue diet with the bowels kept constipated with opiates for at least a week is indicated in cases of third degree perineal repairs and recto-vaginal fistulae.

The postoperative care of the urinary system calls for regular catheterization usually at eight hour intervals until the patient is able to void spontaneously. Some prefer an indwelling catheter for the first two or three days. When catheters are used either indwelling or intermittently, small doses of sulfonamides are indicated as prophylaxis against infection. A check for residual is less than one ounce. The instillation of one ounce of ½ per cent aqueous mercurochrome after catheterization may aid the bladder to regain its tone. Daily urinalysis should be ordered on all cases receiving large doses of sulfonamides or transfusions postoperatively. Postoperative abdominal distention is minimized by the judicious use of morphine, rectal tube, heat tent and prostigmine. In cases of moderately troublesome distention these measures plus the turning of the patient over on her abdomen with the rectal tube inserted is often effective.

Cases presenting more marked distention and vomiting or those having had laparotomy or vaginal surgery with contamination or soiling of the peritoneal cavity, should be treated as for peritonitis with morphine, heat tent, rectal tube and Wagensteen suction with or without the Miller-Abbott tube. Sulfonamides and penicillin in full doses are also indicated both prophylactically in potential or actual cases of peritonitis, that is, in soiling of the peritoneal cavity at operation or in cases presenting signs of infection developing postoperatively. Oral feeding should be used cautiously in these cases. Crile,[9] of Cleveland, recently reported remarkable results in cases of localized or even generalized peritonitis, with the use of massive doses of penicillin; 100,000 units were given every two hours day and night for two days; then the dose was halved and given every two days, totaling four and one-half million units administered within a period of eight days. The combined use of penicillin and sulfonamides is often better than either alone as frequently we are dealing with a mixed infection, some organisms of which are controlled by one and some by the other drug.

Of the postoperative complications referable to the vascular system the first to appear are hemorrhage and shock. The latter is often noted in moderate degree soon after the patient is returned to her room and usually responds to intravenous fluids, heat and elevation of the foot of the bed. Plasma, blood and ephedrine may also be needed in severer cases as well as the use of nasal oxygen. Primary hemorrhage usually appears within the first six hours, possibly as late as 14 hours, and presents such findings as a falling blood-pressure and hematocrit and a rising pulse-rate, air hunger and shock. Early postoperative hemorrhage of severe degree requires location of the bleeding vessel and ligature, in addition to supportive measures.

Hemorrhage appearing later than the first 24 hours usually is secondary to a slough, particularly following vaginal hysterectomy about the tenth to fourteenth postoperative day. These cases following vaginal hysterectomy, which are by no means rare, usually respond to strict bed rest with the foot of the bed elevated. In more severe forms transfusions and even secondary suture of the cuff may be necessary.

The incidence of venous thrombosis and pulmonary embolism is claimed to be as high as three per cent of all laparotomies performed on women. Two types of intravenous clotting are well described by Alton Ochsner who has done much in recent years

to give us a better understanding of this condition. A positive Homan's sign, and a low grade unexplained postoperative fever are very significant in making the diagnosis. Prophylactically, we may do much to prevent postoperative intravenous clotting, he says, by minimizing operative tissue trauma, dehydration, acidosis, intra-abdominal tension, tight bandaging, Fowler's position or Trendelenburg with the knees flexed, shallow breathing, inactivity while in bed, prolonged bed-rest following surgery, and eliminating foci of infection preoperatively. The common practice of placing a pillow under the popliteal spaces is to be avoided, and if a modified Fowler's position is needed, place and keep the thighs and legs in the same axis. The legs should be moved a "thousand times a day." Using the silk technic in suturing with early ambulation postoperatively is gaining much favor in recent years as a valuable prophylaxis against intravascular clotting postoperatively.

The application of dry heat by a light bulb to the perineum in vaginal surgery helps to relieve pain and prevent infection. Vulva pads are best omitted in such cases as they predispose to infection. The abdominal wound is not disturbed unless infection, if present as evidenced by tenderness, induration, pain and fever, is treated by early removal of skin sutures and by establishment of drainage if suppuration occurs. Finally, before the patient leaves the hospital, a check of all drains and packs used is made as it is at least embarrassing to have an overlooked vaginal pack discovered by the patient after she goes home. A printed list of instructions as to care after discharge saves a number of phone calls to the attending physician later and misunderstandings so common when only verbal orders are given.

SUMMARY

1. A plea is made for stricter application of the preoperative requisites of Polak before subjecting a woman to a major gynecologic surgical procedure. More postoperative mortalities are preventable if they are closely followed in elective surgical procedures. This was amply stressed by the investigation of the late Hilliard Miller in his review of deaths at Charity Hospital in New Orleans.

2. Thorough preoperative investigation of the heart, lungs, liver and kidneys should be routine.

3. The blood should be studied from the standpoint of total red and white count, hemoglobin, sedimentation rate, possible dyscrasias, and the Rh factor. Preoperative typing and cross matching is routine and compatible blood should accompany the patient to the operating room.

4. Special attention is required by the obese and the aged.

5. Local and remote foci of infection should be eradicated or minimized and dehydration, anemia, and avitaminosis corrected.

6. Each case should be individualized in choosing the proper anesthetic agent and all anesthetics are safest when administered by trained physician-anesthetists.

7. During surgery the administering of fluids, and at times blood, is vitally important. Avoidance of trauma, excessive blood loss and prolonged operating time minimizes postoperative morbidity and mortality.

8. Closely watching the patient until fully reacted from the anesthetic, control of pain, adequate fluid balance, alertness in detecting immediate or delayed postoperative complications in their incipiency are vital.

9. Adequate preoperative restoration of body proteins in a large group of patients with malnutrition by oral feeding of a high protein, carbohydrate, caloric, low fat diet is emphasized.

10. Finally, as stated by Hilliard Miller, no woman should die postoperatively from such avoidable errors as inadequate or delayed postoperative therapy, failure to detect postoperative complications in their incipiency; uncorrected anemia; undue prolongation of operating time and excessive blood loss at operation; and a general tendency to underestimate the possible risk involved.

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DISCUSSION

Dr. Alolph Jacobs (New Orleans): Dr. Johnson has covered a great deal of ground and it may seem very difficult to keep in mind all the indications, contraindications and precautions presented on the slides, but to those who do surgery these things come to mind as conditions arise.

I will discuss briefly one or two important points concerning contraindications in cases where there is a persistent low grade fever in degenerative uterine fibroids. One may wait forever for the temperature to become normal. Under these circumstances, low fever will persist, the sedimentation rate be rapid and a secondary anemia will be present. Operation therefore is indicated in order to eradicate the cause; proper supportive treatment being infusions and blood transfusions.

Secondary anemia in tubal abortion of an ectopic pregnancy will persist if unrecognized and not operated. Small spurts of blood occur and may persist for days. Under these conditions surgery is indicated in spite of the anemia, proper supportive treatment being given the patient.

Concerning urinary retention after surgery or delivery, it is a good practice to check for residual urine after the patient voids voluntarily for the first time, and continue to catheterize until there is no longer retention. Necessary precaution against bladder infection must be taken.

Dr. Ambrose Storck (New Orleans): One phase of the preparation of the patient going to operation which is very important in general surgical procedures and which often applies in the instance of gynecological patients is the estimation of transfusion requirements. In the past we have depended on hemoglobin determinations, red cell counts and hematocrit determinations, all of which are very undependable and inadequate. In an attempt to arrive at a more dependable means of determining transfusion requirements Dr. Champ Lyons has undertaken blood volume determinations and has shown that most of us are inclined to give too little blood. He uses a photoelectric colorimeter method which is comparatively simple and which any technician proficient in other laboratory procedure can learn to do with accuracy. Since we have been applying this guide in the preparation of patients for general surgery the results have been very gratifying. Many more patients have been getting the amount of blood they really need but would not have gotten if other guides had been depended upon. In gynecologic patients suffering from hemorrhage, infection or neoplasia the method is particularly applicable.

EXPERIENCE WITH SODIUM PENTOTHAL AT HOTEL DIEU

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Our introduction to intravenous anesthesia was very dramatic. It was thrust on us about ten years ago, at this hospital, in the form of a patient from DePaul Sanitarium, who had, in an attempt at suicide, used a Gillette blade with such enthusiasm on his own throat, that when he was placed on the operating table for inspection and his chin lifted up, the posterior pharyngeal wall was plainly visible. His incision extended from jugular to jugular (but did not sever or even nick these vessels or the carotoids), but proceeded very deeply the more mesially the incision extended. It was a jagged and irregular cut, but was remarkably free of bleeding. The only dressing that had been applied was a heavy bath towel which the patient himself held in position.

We were confronted with a serious problem as to the choice of anesthetic. Inhalation anesthesia was out of the question for mechanical reasons, spinal was out of the question because of the location of the injury, local was seriously considered but was discarded because of the patient's mental condition (he was constantly moving about in a highly excited state). The one choice we had was evipal or sodium amytal, intravenously administered, but no one had ever administered it at Hotel Dieu. We had no choice but to read the direction on the package rapidly and administer it ourselves, af-

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ter which procedure, we would race around to the field and begin the tedious attempt at rematching and suturing the numerous structures in the throat. The single dose of anesthetic would last between 30 and 45 minutes, after which time the patient would begin to move. Again the intravenous administration as repeated, again we would rush around and resume our repair. This procedure continued to take place for the three hours that it took to repair the wound, during which time it was necessary for us to resort to artificial respiration several times, and finally had to call Dr. Taquino to intubate the patient for fear of obstruction that was rapidly taking place due to edema.

This experience with intravenous anesthesia naturally etched itself deeply on my memory, and built itself up into a fear of anything that bore that label. Naturally, our conversion to sodium pentothal took longer and much more convincing that the average.

Our next experience with intravenous anesthesia was due entirely to one of the anesthetists employed at Hotel Dieu. I am referring to Miss Sim, and this was early in 1941. Of course, the first few cases were limited to practically nothing but minor cases, or cases that required a very short anesthesia. This group consisted of incision and drainage cases, dilation and curettage, setting of dislocations or fractures, and so forth. A few appendectomies were gradually introduced in our series. It was not until February, 1942, that we began seriously considering pentothal as the anesthetic of choice in practically any and all of our major and minor cases. This was when Mrs. Molly Seeberg became affiliated with this institution. She had been connected with the Hillman-Jefferson Hospital in Birmingham, Alabama, and this hospital was deeply investigating sodium pentothal over a period of years. Her experience and knowledge of this drug, plus the fact that she had given over 2000 anesthetics with it, was the final factor that led me deeply into its use.

HISTORICAL BACKGROUND

The historical background for intravenous anesthesia began with the use of chloral hydrate in 1872 by Ore of France. Following this, a group in Petrograd first used hedonal (methyl propyl carbinol urethane) in 1905. The volatile anesthetics were then used. Ether was given in saline solution intravenously by Burkhardt of Germany in 1909, and chloroform also had a brief trial. In this country Noel and Scuttar first used paraldehyde for this purpose. A brief trial was given ethyl alcohol by Marin of Mexico City in 1929. Avertin with amylene hydrate, first use in 1929 by Kirschner in Germany, had but little intravenous use. None of these received general recognition for intravenous anesthesia.

The first barbiturate to be administered intravenously was somnifen, a mixture of barbital and dial, and was introduced in 1924 in France by Fredet and Perlis. This preparation was subsequently changed to barbital and alurate. Pernoston was introduced by Bumm in Germany in 1927, and is still being occasionally used. It was probably the best intravenous anesthetic to be used prior to evipal. Following this sodium amytal was introduced in this country in 1929 by Zerfas. Pentobarbital sodium (nembutal), was tried in 1930, and found to produce a prolonged postoperative sleep. Evipal sodium was first used in Germany by Weese and Scharpff in 1932. Pentothal sodium was introduced by Lundy and Tovell in 1943. There have been a few barbiturates namely, soneryl, eunarcon, metyl luminal and thio-amytal which have been introduced in recent years, but which do not appear to have particular merit as intravenous anesthetics.

DESIRABILITY

Since the beginning of the anesthetic period, both the surgeon and anesthetist have been hoping to find the anesthetic agent which would produce rapid induction, quiet breathing, normal color, no salivary secretion and complete surgical relaxation; also one that would be rapidly eliminated and could be given with a maximum of safety—an agent that did not alter the function

of the organs, and one from which recovery occurred without nausea or vomiting. Also one that the patient would accept without fear of apprehension were it necessary to administed a second and/or very proximal anesthetic. Our experience, although limited to approximately a series of but 1600 cases, has proved to our satisfaction that sodium pentothal possesses all these properties.

ADMINISTRATION

Sodium pentothal is a lemon yellow powder with a bitter taste associated with all the barbiturates. It has a sulphuric odor, and effervesces when mixed with water. A 2.5 per cent solution is made by mixing 1 gram of pentothal crystals in 40 c. c. of sterile distilled water. A blood pressure apparatus is placed on the arm (not to be used for venepuncture), and tucked close in by the side. The arm to be used for venepuncture is fastened securely on the arm board. A vein, preferably in the cubital fossa, is selected, a tourniquet applied, and a 20 gauge needle attached to a flexible sterile rubber tubing about six inches long, and again attached to a 10 of 20 c. c. syringe, is introduced in the vein, the tourniquet released, and the syringe containing the solution attached to the board by a clamp apparatus. Adhesive tape is used to keep the needle *in situ*, likewise the tubing. The skin may or may not be anesthetized with novocaine before introduction of the 20 gauge needle. Personally, we do not use it, as the one prick necessary to introduce the administering needle amounts to very little more than the prick necessary for the local anesthetic. From 5 to 10 c. c. of solution is slowly administered, taking about three to five mniutes for this introduction. The speed in which sodium pentothal is given is governed by the rate and depth of the respirations. After the above amount is introduced in the vein, it is best to pause for a few moments and carefully observe the individual reaction of the patient. We stress this point, because we have noticed that individuals of the same age, weight and approximately the same physical condition will react differently to the drug, some requiring a much larger dose and some a very small dose to produce the same degree of anesthesia. After a few minutes' pause, further administration of the anesthetic may continue. It is our experience that it takes but from 10 to 30 seconds for the patient to lose consciousness, and but three to five minutes more to be sufficiently relaxed for what we would term a deep surgical sleep where relaxation is complete.

It is our custom to administer oxygen throughout any surgical procedure. Our anesthetists are taught to introduce an airway as soon as abolition of the swallowing reflex or gagging is controlled, and this is done by further administration of pentothal if any resistance on the part of the patient is encountered at this point. Occasionally a nasal airway that extends into the trachea is used and oxygen administered in this manner. The eye signs are insignificant, except for the position of the eye. The pupil is rather small and sluggish in reaction to light. When the eye is not focused in the center it is, as with other anesthetics, indicative of light anesthesia; however, there may be enough relaxation for a major operation.

The depth and the rate of the respirations are the best signs to determine the depth of anesthesia. Very few patients need any further anesthesia after the peritoneum is closed. At the beginning of administration of pentothal, the following signs are noted.

1. Respiration at first may be stimulated to greater depth, followed by a very shallow respiration which persists throughout the administration. The rate, however, does not change. It is the depth of respiration.

2. The pulse rate may increase in rapidity at the beginning of induction, but will quickly regain the normal and remain so, granting that the surgical procedure or loss of blood is not a trying one.

3. There will be a drop in blood pressure of from 10 to 20 points in many patients, again with a return to the patient's normal after less than 10 minutes, granting that the surgical procedure or loss of blood is not a trying one.

SYSTEMIC EFFECTS

It was thought that pentothal sodium was contraindicated in cases of liver damage, but liver function tests by Quick hippuric acid test were done by Dr. B. M. Carraway of Birmingham, Alabama, in 100 cases, first doing the test before operation, and each day thereafter for 10 days. There was no drop in liver function and most of these tests were done on patients who were jaundiced or had liver damage. The same test was reported by Boyce and McFetridge in other anesthetics. On the first day ethylene showed at 21 per cent drop, ether a 25 per cent drop, and spinal a 49 per cent drop. None of these returned to normal until about the seventh to tenth postoperative day. Again, Dr. Carraway, in connection with Abbott Laboratories, performed extensive research on rats, rabbits, cats, dogs, and monkeys. One monkey was anesthetized under pentothal for 18 consecutive days, and his abdomen reopened each day, removing tissue from the liver for microscopic examination. He found no change in the liver at the end of 18 days, except some fatty infiltration, which is regarded as common for all types of anesthesia.

In another experiment that was carried out four dogs were used. All four were anesthetized with sodium pentothal, the abdomen opened and tissue removed for microscopic study. Two dogs were held as controls, the other two being anesthetized for a 20 minute period every 24 hours for 21 days. At the end of 21 days all four of the animals were sacrificed under sodium pentothal anesthesia. Except for fatty infiltration, there was no change in the liver cells of any of the dogs, and there was as much fatty infiltration in the controls as the other two.

The hemoglobin, erythrocytes, leukocytes, differential and urinalysis were run on a large series before, during and after operation, without any changes whatsoever. Blood chemistry was run before, during and after operation, also coagulation and bleeding time were made before, during and after (at 10 minute intervals during the operations), with no changes of consequence.

Electrocardiograms were recorded on 53 cases and reported by Dr. Edgar Hull. These tracings were taken some before, some during, some immediately after operation, and some one to 10 days after operation. There were no significant changes.

Kidney function tests were likewise run on a large series with negative reports as to damage.

THE PATIENT UNDER SODIUM PENTOTHAL DURING OPERATION

Much of the objection advanced by anesthetists and surgeons regarding the use of this drug during major abdominal operations was the lack of relaxation. In our series of cases we have found just the opposite, and relaxation is so complete that it compares very closely with that obtained with spinal. We believe that the reason for others, who employed this anesthetic, not obtaining the excellent relaxation that we have is due to the fear of both the surgeon and anesthetist to push pentothal to its maximum effect, consequently their patients were kept in a light plane of anesthesia, with resulting rigidity of the muscles and some straining. When pentothal was first introduced, a 10 per cent solution was used. This rapidly gave way to a 5 per sent solution. Personally, we have never used anything but a 2.5 per cent solution, allowing for a further margin of safety by the weaker dilution. We do admit, however, that our deep surgical anesthesia is pushed close to the minimal lethal dose of the drug, and for this reason never permit its use by any but an experienced anesthetist who has had special training with the administration of this drug.

Another feature that recommends itself to the operator is due to the shallow respirations that persist during its administration. This minimizes the intestines constantly forcing themselves into the field of operation (particularly good is this feature in cases where infected material is encountered) and consequently the infection is not spread as readily. We have stressed the point that oxygen is administered constant-

ly throughout the operation to compensate for this shallow respiration.

Closure of the peritoneum is easily accomplished with a relaxation comparable to spinal, another feature which should recommend itself to the surgeon.

The use of the sulfonamides or penicillin in the abdominal cavity is not contraindicated with sodium pentothal.

Occasionally there will be hiccoughing, sneezing in some isolated cases. This was corrected by further administration of a small amount of pentothal, plus rebreathing the patient with carbon dioxide and oxygen. Usually, the preoperative administration of atropine will prevent this. However, if the stomach, upper intestines, or liver is handled too much or too roughly, it will produce these symptoms, which are much harder to overcome. The patient does not lose any fluid on the table because there is no sweating.

If for any reason it is desired that there be quick recovery from the anesthesia, 3 to 5 c. c. of coramine or metrazol is given intravenously. A few whiffs of straight carbon dioxide followed by straight oxygen may be given. Deep labored breathing will be produced by the carbon dioxide, and straight oxygen will give the patient an outstanding pink color. It is almost routine that the anesthetist give the patient 1 or 2 c. c. of metrazol or coramine, followed by oxygen after the peritoneum is closed. This will curtail the postoperative sleep. I have often questioned the advisability of this procedure if the condition of the patient is good, for what is the objection to a one or two hour sound sleep after the patient returns to his bed. On rare occasions, and we leave this decision entirely to the anesthetist, it will be necessary to supplement pentothal with nitrous oxide, an easy procedure since the patient already has a mask on. On still rarer occasions it has become necessary to switch to ethylene or cyclopropane, which is also easily done. Anesthetists who have given sufficient pentothal sodium anesthetics will develop confidence in it and learn that it is not necessary to administer it continuously during an operation, but only as the patient requires it. They also learn that the drug is somewhat cumulative in effect, and that the longer the operation, less and less of the drug will be required to keep the patient sufficiently relaxed. The amount to be given at the end of a two or three hours procedure is measured almost in the microscopic part of a gram.

POSTOPERTIVE RECOVERY

It is a well known fact that with pentothal the recovery to consciousness will almost invariably be in direct ratio with the length of the operation; that is, the longer the operation and the longer the drug is administered, the longer the patient will sleep after returning to his bed. In procedures up to one hour, an anesthetist who has had experience with the administration of this drug will have the patient beginning to spit out the airway and move about on the operating table. The very great majority of our cases, however, will begin to show signs of reacting in from one hour to two hours. There is usually a period of from 10 to 30 minutes when the patient will behave as most anesthetized patients do, and thrash about and attempt to sit up. Care is taken to instruct the nurses on the hall not to give the patient a postoperative hypodermic at this time. If left to go through this period of restlessness, the patient will relapse into a quiet and peaceful sleep for about two hours, after which time he will wake up quietly, like coming out of a natural sleep. After this period, it is safe for the nurse to administer a hypodermic for the relief of operative pain. If, however, a nurse becomes panicky at the first reaction of the patient, or does not know of the ill effects of a narcotic at this time and proceeds to administer morphia, pantopon, or dilaudid, he is liable to relapse into a deep surgical sleep for several hours, with possible impaired respiration and cyanosis. Unfortunately, the ideal postoperative procedure would be to have a nurse who is trained with patients reacting from this drug constantly on duty at the bedside until reaction is complete. It is also advisable to have at the patient's bedside a tank of oxygen-CO which should be administered

through nasal catheter without excitement or alarm—in contrast to the present procedure which calls for pandemonium and great fright to the relatives of the patient sitting around the bed should oxygen be required at a moment's notice.

Again, the nurses on the hall become very alarmed at the shallowness of the respiration that continues for a while, but they should be taught that if the respiratory rate and the patient's color are normal, there is no need for alarm.

One of the features that recommends itself to those who use it and those who receive it is the absence of postoperative vomiting. It is our usual instruction that the patient may nourish as often as desired, as soon as reaction is complete, and if the operation itself does not contraindicate. At first we permit small amounts of surgical liquids, but that same afternoon nourishment may be given freely as the patient desires. We find that usually a single 1500 c. c. infusion of 5 per cent glucose is greatly beneficial, because the one peculiar reaction that a patient usually complains of is intense hunger, which we believe is due to a using up of the glycogen supply in the liver and this glucose, plus the usual surgical liquids, quickly replaces this deficiency. This is purely a conjecture on my part, however.

I have noticed a markedly reduced amount of "gas pains" and postoperative distention since using this drug.

Whatever postoperative nausea or vomiting is encountered I believe sincerely is due to the patient's idiosyncrasy for the opiates, or from an overzealous nurse who will overnourish the patient for the operator's benefit.

Occasionally some patients will have double vision or an inability to focus for 48 hours. Reviewing the literature on the subject, we are unable to find any explanation for this phenomenon. In no case, however, has it ever persisted over two days.

CONTRAINDICATIONS

The literature on this subject is controversial, but is gradually leaning to the very enthusiastic view that we ourselves carry. Extreme youth and senility formerly headed the list. In our limited series, the youngest patient in whom pentothal was used was four years old, and the oldest 83. Both had gangrenous appendices, and made uneventful recoveries. I can see, however, in senility that a prolonged sleep if an overdose of the drug were given would certainly make for a good start in a hypostatic pneumonia. In infants, naturally the dose is very much smaller, the big objection being the smallness of the veins and the difficulty of introducing the needle.

Operations on the face and in the throat, where much mucous is liable to form and collect if the vomiting reflex is absent for a prolonged period, would naturally predispose for aspiration with the resulting aspiration pneumonia and lung abscess.

We have used this anesthetic with good results on three patients with bad appendices who were also in the midst of a severe bronchial asthmatic attack. We have also used it in at least 50 major laparotomies in patients who had severe heart murmurs. Of course, the hearts were compensated at the time of operation, or this anesthetic would not have been attempted.

Cases of pneumonia are definitely a contraindication, but does not this condition cause great concern in the selection of any of the other anesthetics?

Hyperthyroidism is another contraindication, because of the rapidity with which detoxification of the anesthetic is accomplished, making the administration a difficult problem for the anesthetist.

Myxedema, where the reverse process exists, and where detoxification is retarded and there is likely to be a cumulative effect due to a slow detoxification, also contraindicates the use of this drug.

Operations on the intestines do not lend themselves readily to this anesthetic, due to the reflex action causing hiccoughing or sneezing. I do believe, however, this will be overcome at a later date.

In operations of great length there is a wide divergence of opinion in the literature, both sides being equally as emphatic. It is

my personal belief that with an experienced anesthetist the length of time should not be considered.

Alcoholism may be regarded as a contraindication due to disturbed basal metabolism, also to liver damage, and also to the possibility of hypostasis. Also, there is a tolerance to the drug, requiring much greater amounts to be administered, with the possibility of a very sudden cumulative effect, unto death.

In our series, we have not chosen our cases, and all those except where a definite contraindication was noted, we have administered it routinely. Our cases have included innumerable appendectomies, a large number of hysterectomies, an equally large number of pelvic cases (tubes, ovaries, cyst), hernias, several gallbladder, tubal pregnancies, plastic repairs of the perineum and cervix, vaginal hysterectomies, breast cases, hemorrhoidectomies, and one classical cesarean section. Incidentally, this one and only cesarean section with pentothal was ideal from the maternal point, but it took us almost an hour to revive the infant.

Although the literature tells us to the contrary, I am very hesitant to use pentothal on patients who are debilitated, or who have been exsanguinated, or with a marked hypotension, due to the fact that pentothal almost invariably produces a drop in pressure at the onset of administration. In reviewing the few cases that have given us considerable concern on the table, it was invariably this type, and insufficient rehabilitating preoperative measures had been used. We have had but three cases in this series that required resuscitating measures on the table, and I believe that in retrospect, I was more frightened than familiar with the true condition of the patient. Artificial respiration, plus coramine or ephedrin, plus oxygen-carbon dioxide forced into the patient's lungs brought about a satisfactory response and it was possible to continue the operative procedure. Two of these cases occurred before the abdomen was opened, the third after two hours of hard surgery in the pelvis, while Dr. Moule-dous had one case to cause concern after being returned to his room (we doubt that the true condition of the patient was recognized).

SUMMARY

1. Sodium pentothal is a non-irritating anesthetic, giving a smooth and rapid induction.

2. The pulse, respiration, and blood pressure are more nearly normal than with other anesthetics.

3. The color is pink and the skin warm and dry, due to no loss of body fluids.

4. Excellent surgical relaxation is obtained when properly given.

5. No nausea or vomiting are present except when the patient is susceptible to the narcotic.

6. Pentothal is very pleasant from the standpoint of the patient, and there is no dread of repeated anesthetic.

7. It is a safe anesthetic when administered by an anesthetist who is familiar with its action.

OTHER USES OF SODIUM PENTOTHAL

1. To supplement local, spinal, or caudal anesthesia.

2. To combat toxic effect of a local anesthetic. Should a reaction occur, inject 2 to 4 c.c. of a 4 per cent solution. This will counteract particularly the toxic effects of cocaine or its derivatives.

3. To relieve convulsive states that occur with drug poisoning; tetanus, eclampsia, ether anesthesia, and so on.

4. Occasionally used as a "truth serum."

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DISCUSSION

Dr. Louis Levy (New Orleans): Dr. Souchon is to be congratulated on bringing before the Orleans Parish Medical Society the timely paper on sodium pentothal as an anesthetic given intravenously.

I have been fortunate enough to peruse this paper with the idea, if possible, to add to his fund of knowledge of sodium pentothal and the technic of administration. I can but commend the author and advise strict adherence to his detailed instructions.

It is interesting to note the advance in anesthesia. In about 1910, I reported 1512 cases of ether anesthesia, without an anesthetic death. Now that I have nearly discarded ether as an anesthetic, I can report no less than 200 cases of sodium pentothal anesthesia without a death from the anesthetic. I was first impressed with the articles appearing in the journals and then by seeing Dr. Souchon use it on several cases before I decided to use it.

I am, in experimental work, "not the first to go or the last to follow", and I have used this anesthetic after fully deciding it was a safe one.

The advantages and cautions in its use to get the best results are worth emphasizing:

1. Have your patient calm; give the usual sedative preoperatively.

2. Have an anesthetist skilled in the use of intravenous anesthesia.

3. Use oxygen as an adjunct, as shallow respirations are one of the effects of this anasthesia.

4. Operations lasting two and one half hours are best continued with gas anesthesia.

5. The anesthetist should be relied on to announce the maximum dose, deciding by the time of operation the condition of the patient and the severity of the operation.

Some superior points in and after administratior are:

1. Ease of administration.

2. Perfect relaxation: I have described "the abdomen as a wet paper bag" during this anesthetic.

3. The patient sleeps as though in a state of suspended animation; and, unless long operations, loss of blood, or rough handling interfere, awakens as from natural sleep.

4. Allowing your patient to sleep and not be awakened by the use of antagonistic drugs; such as, metrazol, is of great benefit to the patient.

5. Catch the awakening pains by the use of a narcotic so that the frightening ordeal of surgery will not be evident; the narcotic is begun as soon as restlessness appears.

6. An airway left in situ eliminates the dangers of tongue swallowing and can be removed as soon as signs of awakening appear.

I have noted in the literature that curare is being used with sodium pentothal to increase relaxation; I have yet to need an additional drug to induce increased relaxation in the administration of sodium pentothal.

I feel that the Orleans Parish Medical Society and Hotel Dieu are indebted to Dr. Souchon for presenting his valuable paper on sodium pentothal anesthesia.

Dr. Dean H. Echols (New Orleans): Fortunately some of our surgeons take the trouble to interest themselves in anesthesia. I have just one small thing to add, namely, that pentothal has proved to be just as important in neurosurgery as in Dr. Souchon's work. I estimate that 60 per cent of the neurosurgical procedures which we have carried out in the past two years have been done under pentothal anesthesia.

INTRAVENOUS PYELOGRAPHY AS AN AID IN DIAGNOSIS*

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Intravenous pyelograhy or urography has been in general use long enough now to enable one to gauge its indication and value. In infants and children it avoids the necessity of a general anesthetic and the accompanying radiographic difficulties. In these small patients when the intravenous method is impossible the dye may be injected intramuscularly or subcutaneously with excellent results. In the aged or in hypersensitive patients or in some anomalies or obstructions of the urinary tract distal

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to the bladder the intravenous or excretory method may solve your problem.

While the character of the shadows of biliary calculi, phleboliths, calcified mesenteric glands or other calcifications outside the urinary tract are generally distinctive on a plain K. U. B., they can at times be annoyingly similar to urinary calculi. The intravenous pyelogram will aid considerably and often conclusively in their differentiation.

The intravenous pyelogram will give you the size, location and contour of the pelves, calices and ureters. Films made in various positions will demonstrate ptosis or displacements of the urinary system, hydronephrosis, kinking of the ureters or at times aberrant vessels. Anomalies of the urinary system are demonstrated. In deciding whether an abdominal mass arises from the urinary tract the intravenous pyelogram may decide the issue by demonstrating a normal tract in normal position, thus excluding the mass as of renal origin; or it may show the mass to be a normal kidney abnormally placed; or, too, it may show the pathology to be definitely arising from a portion of the urinary tract. However, when a suspected renal tumor is demonstrated by intravenous methods a retrograde examination should be done for confirmation.

Right here it may be emphasized that the intravenous pyelogram can never replace cystoscopy and retrograde pyelography. Anyone even moderately well informed will realize there are too many procedures other than radiography which can be done during retrograde pyelography to allow us to accept intravenous pyelography as a complete substitute.

The technic for intravenous or excretory urography is relatively simple. It can with proper supervision be done in the office although all ours are done in the hospital probably as a matter of convenience. The patient is prepared as for an ordinary K. U. B. examination, with this addition; no fluids are allowed after the evening meal preceding the day of examination. This is to obtain a better concentration of the dye in the urine. The morning of the examination a scout film is made. If it shows an over amount of gas in the intestinal tract is it better to delay the examination until the condition is corrected. This may be accomplished by the use of castor oil and enemas with postponement of 24 hours. At times enemas or pitressen (if not contraindicated) may clear the condition in about one hour. Twenty or thirty c. c. of skiodan or a similar preparation is administered slowly. Routinely films are made 5, 15, and 30 minutes after completion of the injection. One upright projection should be made and oblique one when indicated. When there is hydronephrosis of marked extent, film studies should be delayed a matter of hours.

Contraindications are listed as liver disorders, nephritis, uremia and most important one the iodine sensitive patients. We have encountered no difficulties ourselves although fatalities have been reported.

CONCLUSION

We wish to state that in our experience the intravenous pyelogram has proved extremely valuable as will be shown in the demonstration of some lesions by lantern slides.

BIOLOGICALLY FALSE-POSITIVE WASSERMANN TESTS IN NON-SYPHILITIC PATIENTS*

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Thirty years ago the interpretation of results of serologic studies was simple—a positive or negative report of a single test was generally accepted at its face value in the diagnosis of syphilis. Today the problem is entirely different. Using a battery of two to eight technics, the result of each technic is reported in one of six accepted terms, and the report cannot be applied without clinical interpretation.[10] The necessity exists of all physicians understanding the limitations of the serologic tests for syphilis, as well as having ready

*Awarded the Jacob C. Geiger Medal offered to a Tulane University Medical School student for the best thesis on a public health problem.

knowledge of the variety of conditions that have been found to produce biologic false-positive serologic tests.

The social stigma that is attached to syphilis causes a psychologic trauma which obviously demands considerable effort to avoid an erroneous diagnosis. During the past war this problem also had great military importance.

Even with the present improved standardization, there is still considerable instability of the sensitivity of a given procedure, so that conflicting reports between different laboratories, or between successive tests in the same laboratories, are frequently encountered with syphilitic sera of border line reactivity. In view of the possibility of excessive sensitivity, as well as the possibility of clerical errors, a single positive report should not be considered valid evidence of syphilis or of a biologic false-positive reaction.[4]

The criteria that is generally accepted for the term biologic false-positive Wassermann is that the serum is positive to one or more types of tests, but which becomes negative after a few weeks or months without antisyphilitic treatment. The reliability of these cases depends on the reliability of the laboratory which performs the tests and upon the demonstration of more than one positive blood specimen before the tests become negative, in order to eliminate suspicion of a clinical or technical error.

Serodiagnosis of syphilis was inaugurated by Wassermann, Neisser, and Brunk (1906) with their complement fixation tests. Soon after, Michaelis, using a similar antigen, the saline extract of syphilitic liver, outlined a method for producing visible precipitates with syphilitic serum, thus describing the first precipitation reaction. Following this it was discovered that extracts of tissues not containing *Treponema pallidum* are satisfactory antigens for complement fixation and precipitation tests, and that alcoholic extracts of organs from normal animals make more satisfactory antigen than aqueous extracts of syphilitic organs as used previously. These alcoholic extracts of normal tissue contain the lipoid substances. Even though these lipoid extracts are not true antigens in a biologic sense, they react in an extraordinary specific manner with syphilitic serum. There have been numerous hypotheses regarding the nature of syphilitic reagins and the mechanism of non-specific lipoid antigens in producing positive serologic reactions for syphilis. At present, none of the proposed theories fits all the facts.

Numerous modified methods of complement fixation testing have been described and accepted, but it was not until 1922 that the great possibilities of flocculation methods were demonstrated. The main advantage of the first flocculation tests was their apparent simplicity. Various flocculation tests had by 1928 reached such degrees of sensitivity and specificity that, following comparison with various accepted complement fixation tests at the Second Laboratory Conference of the League of Nations held in Copenhagen, the better flocculation tests were considered equal to the better Wassermann tests. Results similar to the above were obtained at the Montevideo Conference (1930), where the best flocculation tests were demonstrated to be superior in sensitiveness and equal in specificity to the Bordet-Wassermann reaction and its modifications. The results of the American Serological Conference (1935), in which serodiagnostic tests for syphilis used in the United States were evaluated, indicating that efficient flocculation and efficient complement fixation tests for blood or spinal fluid specimens are of about equal value.

Additional conferences held in the United States have shown that at least five complement fixation and flocculation tests give satisfactory results when performed by persons other than the originators.[16] These are the Eagle, Hinton, Kahn, Kline, and Kolmer tests, the technics of which will not be discussed here. However, the Kahn verification test and the Gaehtgens *Treponema pallidum* (Reiter strain) complement fixation test, because of their possible future value in distinguishing between true and

false-positive serologic reactions, will be discussed.

Kahn in attempting to identify false-positive serologic reactions in human beings, conducted studies concerning the differentiation between the reaction in apparently normal animals and in known cases of syphilis. These studies led to the observation that the temperatures at which serologic tests are carried out provide a means of differentiation. Various experiments were carried out including tests at different temperatures on normal animal serum, non-syphilitic human serum, and syphilitic human serum. The precipitation technic is carried out at 37° C. and 1° C. Serums that give positive reactions with a diagnostic test are examined with this procedure, and the precipitation results noted. The result is reported "positive" (syphilitic type of reaction) when precipitation occurs at 37° C. with practically negative results at 1° C. The result is reported "negative" (general biologic type of reaction) when precipitation occurs at 1° C. with practically negative results at 37° C.

Kahn states that the verification test is intended to be used as a supplementary procedure to diagnostic serologic tests when such tests give doubtful, weakly, temporary, or fluctuating positive reactions in cases of asymptomatic syphilis. If the results of the verification test correspond to those of the diagnostic test, they may be interpreted as corroborating the results of the latter test. If the results of the verification tests are negative, the probability is that the reactions given by the diagnostic test are non-specific. The major function of the verification test is to help reduce, and not increase, the number of cases of "serologic syphilis," therefore the test should be utilized as a supplementary procedure primarily with the diagnostic test and not with supersensitive tests.[8] The extent to which the verification test can be employed to verify the specificity of supersensitive tests is yet to be determined. Some observers, namely Chargin, Rein, and Schaffer, find it to be quite trustworthy, while others, namely O'Leary and Schoch report repeated failures.[19]

In 1929 Gaehtgens reported that syphilitic serums gave positive complement fixation with phenolized cultures of *Treponema pallidum* (Reiter strain) and recommended the use of this phenomenon for the serodiagnosis of syphilis. There have since been numerous reports, most of them from German laboratories, which have confirmed the practical utility of the test as recommended by Gaehtgens. Many of the reports indicated that the reaction is more sensitive than the Wassermann or flocculation tests with tissue lipoid, and its greater specificity has been repeatedly stressed.

In 1940 Erickson and Eagle carried out a study of the practical utility of the spirochetal complement fixation on 1,032 specimens, in combination with the icebox Wassermann test and the Eagle microflocculation procedure. In carrying out these tests spirochetal suspension was simply substituted for ordinary Wassermann antigen. Of the 1,032 serums examined 490 were from patients under treatment for syphillis and were used as a check on sensitivity; 542 serums from patients of a general dispensary and hospital population who had previously been found to have negative macro-flocculation tests, were used as a check for specificity.

In the syphilitic group—the proportion of positive results with the Wassermann, flocculation and spirochete technics were 57, 67, and 74.5 per cent respectively; while the total serums detected (positive and doubtful) were 68.5, 76.5 and 85 per cent respectively. Moreover, of the 436 serums which were detected by some one of the three tests used in combination, only 20 were missed by the spirochetal complement fixation test, as compared with 63 for the flocculation test and 83 for the Wassermann. The superiority of the test using cultured spirochetes as antigen is manifest. The high proportion of serums detected is particularly noteworthy since these serums were collected from patients who, on the average, had been given significant amounts of anti-syphilitic treatment.

As to the control group of 542 flocculation negative patients, 522 were negative to both the Wassermann and spirochetal technics. Of the remaining 20 there was one whose reaction was positive to the Wassermann test and negative to the spirochetal complement fixation test during an attack of jaundice; when the jaundice disappeared, the Wassermann reaction became negative. A second case, positive to Wassermann and spirochetal fixation tests, was known to have congenital syphilis. There remained for analysis 18 cases in which spirochetal complement fixation reaction was positive or doubtful, in the face of a negative Wassermann and negative flocculation tests. On clinical recheck from standpoint of syphilitic infection, repeat serologic tests, or both, were feasible in 17 of the 18 patients. The data on these patients show that a definite diagnosis could be made on the basis of history, clinical findings or repeat serologic tests in no less than 14 of the 17 cases, and in at least one of remaining three there was strong presumptive evidence of syphilitic infection.

From the above it is evident that the Gaehtgen's test gives promise of being the most important serologic step since the Wassermann discovery, even though at present it has a very narrow useful range (1:6 to 1:8), being anticomplementary in dilutions 1:2 to 1:3 and extremely weakened in dilutions of 1:10, and that it is a proprietary preparation.[6]

With the assumption that the routine Wassermann like reactions are understood, the possible mechanisms of false-positive tests will be considered. It is conceivable that there may be present in the serum: (1) an antibody identical with the Wassermann antibody produced in syphilis; (2) an antibody differing in some way from time to time with true Wassermann antibody but which cross reacts with Wassermann antigen or some component thereof, and (3) physio- chemical changes, not involving antibodies, which produce flocculation or complement fixation reactions.

If the antibody is formed in response to Wassermann antigen released from the host's tissues in a suitable form, rather than to spirochetal antigen, it would not be surprising if other disease agents occasionally produce the same reaction. In such cases the antibodies would be identical and no possible improvement in the serologic tests for Wassermann antibody could eliminate false-positive biologic reactions. There is no way of knowing at present what proportion, if any, of non-syphilitic positive tests belong to this category.[4] It has been shown by Lund that in supposedly normal serums that there is a very low titer of Wassermann antigen. This was demonstrated only after increasing the ratio of serum to antigen approximately ten times those used in diagnostic tests. Malloy and Kahn have been able also to show that normal sera contains some Wassermann reagin. It is suggested that occasionally a normal human serum may contain enough of this reagin to give a positive test for syphilis. Eagle in 1941 reported a serologic study on 40,545 white college students of both sexes. Sixty-two of these were reported to have positive or doubtful positive serologic tests (40 positive—22 doubtful). Of the doubtful cases it was satisfactorily estimated that an incidence of only 1:4000 existed. Statistically this result can be regarded as negative, but to each individual case the interpretation is of the utmost importance.[1a]

The main hope of the problem of biologic false-positive biologic Wassermann seems to fall in Group 2 above. Several examples of a similar phenomenon are in evidence today. The best example in use today is that of the heterophile sheep cell agglutination tests used in infectious mononucleosis. No definite evidence is yet available concerning the possibility of this described cross reacting, although different type antibody.

Group 3 above cannot be adequately disproved. It has been stated that alteration in blood cholesterol and blood lipid content may play a role in false biologic positive Wassermann reactions especially in pregnancy and jaundice, where these substances are elevated. Results of studies done by Cardon and Atlas (1942) seemed to indicate that a condition of hyperpro-

teinemia is not associated with false-positive reactions. The authors state, however, that their series of cases is too small to make adequate conclusions and propose that in cases of false-positive tests that the total protein and serum globulin concentrations be determined when there is reason to suspect such a reaction.[9] No other adequate data are available concerning this group.

Various other possible explanations have been proposed in regards to conditions causing false-positive biologic reactions, and therefore will be considered under each disease or cause discussed.

INCIDENCE IN VARIOUS DISEASES

Malaria: Dawber has pointed out that malaria may be one of, if not the chief cause of false-positive Wassermann reactions. This condition is quite common and evidence has been presented that it is often present in a subclinical state; particularly chronic and latent malaria may produce positive tests which may easily be mistaken for latent syphilis and that the distinction between the two will not always be easy. At the Maine hospital, in Norfolk, Virginia from 1936 to 1940 there were a total number of 64 cases of malaria, with a total of 19 cases with positive serologic tests. Seven of these were definitely diagnosed as syphilis, four probably due to syphilis, and eight with false-positive serologic reactions. From a study of these cases it is concluded that if one allows a month to elaspe following a malarial infection, the serologic reactions should certainly have become negative, assuming that adequate malarial therapy had been given.[5]

In the 1935 Evaluation Survey 36 non-syphilitic patients in various stages of malaria gave 11 to 19 per cent positive results with various tests. A more extensive study, by the same committee, of 266 patients found that only 4 per cent gave positive and doubtful Hinton, Kline diagnostic and Kolmer tests.[4]

Eagle found some degree of transient reactions to the Wassermann or Eagle flocculation test in nine of eleven cases inoculated with Plasmodium vivax.

Potter, Bronstein and Gruber point out that malaria will be one of the post-war problems, but also emphasizes that the problem in relation to false biologic positive Wassermann reactions is not considered by most physicians. In a well defined controlled study they took blood and spinal fluid form 100 consecutive patients with malaria within the first 48 hours of entrance to the hospital. These 100 patients gave no history of syphilis and none had had syphilis registers opened on them. Those who had positive or doubtful blood tests had repeat tests done about once a week until negative results were obtained. Twelve per cent had positive tests, and 10 per cent doubtful tests. The spinal fluid Wassermann reactions were negative in all cases, so it is suggested that the factors which produced the biologic false results in the blood are not present in the spinal fluid, although the spinal fluid is of no value in judging whether or not the blood serologic reactions indicate the presence of syphilitic infections. All serologic reactions of these 22 patients were negative within one month, although no definite conclusion is reached on the length of time required for the reaction to become negative. It is pointed out, however, that 10 of the 22 soldiers had a change in the Wassermann reaction without a change in the Kahn reaction, which fits in with statements by Eagle and Mohr that serums that are positive with sensitive tests and negative with more sensitive ones are probably not syphilitic.[14]

It can be concluded that although there is definite evidence of the occurrence of false positive test with malaria, that there is, however, need for further study concerning the mechanism for reaction, and average time length of persistence of the reaction.

Infectious Mononucleosis: The first case reported of false serologic tests in this condition, was by Löhe and Rosenfeld[4] in 1928. Hatz in 1938 published one clear-cut case with strongly positive transient Wassermann reactions and simultaneously negative Kline tests.

Bernstein in 1938 reported six cases in

which the Wassermann and the Eagle flocculation test, or both, became temporarily positive during the course of infectious mononucleosis.

The incidence of false-positive serologic reactions in infectious mononucleosis is difficult to determine with any degree of accuracy. According to the combined series of Goding, Saphir, Sudusk, Bernstein, and Kaufman, there were 29 patients with false-positive reactions out of 183 patients with infectious mononucleosis who had tests for syphilis performed.

It has been pointed out by instances reported in the literature that individual cases of infectious mononucleosis with false-positive serologic tests fail to reveal anything characteristic about the disease in clinical course, the blood count or smears, or the sheep cell agglutination tests. There does not seem to be any quantitative relationship betwen the heterophile antibodies, which give rise to the Paul-Bunnel reaction, and the substances responsible for the positive complement-fixation tests or the various flocculation tests (Kline, Kahn, Eagle). False-positive reactions do not seem to be more frequently encountered with one serologic test than with another, except in so far as certain tests, such as the Wassermann are more commonly used.[9]

Yaws: This disease is known by all to be caused by a spirochete which is morphologically almost indistinguishable from *Treponema pallidium* and shares many of the clinical characteristics of the disease. Wassermann serologic reactions are known to occur regularly with this disease, and may or may not be considered as a false-positive biologic reaction. Moore states that the incidence is 100 per cent with this disease.[2]

Tuberculosis: As yet there has been no definite conclusion reached concerning whether tuberculosis actually gives rise to false-positive biologic reactions. However, if it did in even a small percentage, this would be significant in so widespread and chronic a disease. Davis agrees with Sweany who has reported that in 1000 autopsies of patients dying of tuberculosis, pathologic signs of syphilis were found in one-third of the 4.1 per cent patients with a positive Wassermann reaction. Inasmuch as it is known that negative autopsies are not unusual in old syphilitics, he concluded that there is "no reason to warrant the suspicion that tuberculosis causes any more than an insignificant number of false reactions,"[4]

Trypanosomiasis and Kala-azar: Early experimental trypanosomal infection of rats and rabbits was reported to cause positive Wassermann and flocculation reactions, but it was found later that even normal rabbits gave at times a positive reaction. No definite evidence has been presented within the last ten years that clinical trypanosomiasis produces false serologic reactions.

Various conflicting reports are available concerning false serologic reports, but it is stated by Davis that the laboratory work in tropical countries is, in general, not adequately standardized and that the chronic nature of the disease prevents the application of the criterion that the reactions be transient.

Leprosy: It has long been known that leprosy can produce positive biologic reactions, which are reported as being quite frequent. In the 1935 Evaluation Survey 50 leprous serums were examined and it was found that the incidence among five accepted tests varied from 40 per cent with the Hinton to 72 per cent with the Eagle flocculation test.[4] Moore states that the incidence is between 40 and 80 per cent.[2]

Due to the fact that this disease is rare in the United States there is little need for serious concern by the practicing physician.

Vaccination and Immunization: According to various reports, biologic false-positive reactions occur with some frequency following smallpox vaccination. A recent control study, by Rein and Elsberg (Army Medical School), seems to confirm previous reports and will be considered in some detail since this is a most important problem.[15]

The series were adequately controlled, using only non-positive reactors at time of smallpox vaccination (tetanus and typhoid immunization also given). All specimens

were subjected to Kline diagnostic, Kline exclusion, Boerner-Jones-Lukens, Mazzini and Kahn standard flocculation tests, and Kolmer complement fixation test. An attempt was made to examine each subject serologically at weekly intervals.

"The types of skin reactions due to the vaccine virus were classified into three groups:

(1) Vaccines reaction (primary take);

(2) Vaccinoid reaction (secondary or accelerated reaction);

(3) Immune reaction (immediate reaction).

"One hundred twenty-nine individuals developed a vaccinoid or vaccinia reaction following smallpox vaccination, of whom 58 (44.9 per cent) showed doubtful or positive tests. In this group of serologic reactors 50 (86.2 per cent) developed their first positive serologic reaction between the eighth to fourteenth day following the vaccination. Three individuals developed the first positive serologic reaction on or before the seventh day, and 5 individuals developed the first positive reaction between the fifteenth and twenty-first day following the vaccination.

"Eighty individuals developed vaccinia reactions of whom 41 (51.2 per cent) showed false-positive reactions, whereas 49 individuals developed vaccinoid reactions, of whom 17 (34.7 per cent) showed false-positive serologic reactions. This would seem to indicate that false-positive serologic tests occur more frequently in patients in the vaccinia group than in the vaccinoid group."

Thirty-six individuals, who developed immune reactions, had an incidence of 13 per cent serologic reactions. Two appeared in the first week, none in the second week, two in the third and one in the fourth week following vaccination. These serum reactions usually disappeared in one week. The latter immune reactor series is too small to draw any conclusions.[15]

Various percentage figures have been given concerning the frequency with which false-positive reactions occur with smallpox vaccinations, and range from 11 to 51 per cent.

It has been shown by Arthur and Hale that on 95 soldiers who had received smallpox vaccination, typhoid injection, one injection of yellow fever vaccine and three tetanus injections within a three month period, that 14.8 per cent of these men had a temporary change in the normal negative Kahn reaction. This change persisted for one to two months and then faded out. He points out that before a diagnosis of syphilis should be made after routine immunizations that at least one to two months period should elaspe.[1]

Heimoff in 1944 reported a series of eight people with biologic false-positives, in whom only a recent stimulating dose to tetanus toxoid was a common factor. These eight persons all had negative histories of syphilis, all maintained a positive serologic test for six to twelve weeks, and all reversed to negative without treatment.[7]

From the above considerations, although not definitely conclusive, it is evident that smallpox and tetanus toxoid vaccinations, should always be kept in mind when serologic tests for syphilis, without history or physical findings of syphilis are positive.

Rat Bite Fever: There is a slight morphological resemblance between *Spirillum minus* and *Treponema pallidum*, although in only a few cases was it ever proven to be the etiological agent of this disease.[4a] Seventeen cases have been reported in the literature since 1930 but only 10 had positive Wassermann or flocculation tests.

In 8 cases tested serologically in which *Streptobacillus moniliformus* had been recovered from the blood stream by culture, three had positive tests for syphilis. One probably had congenital syphilis, the other two were laboratory injections (no follow up on these cases).[4] From the evidence presented in other reports, no definite conclusion can be reached as to whether false-positive biologic Wassermann reactions occur with injection with this organism. In a milk borne epidemic in Haverhill, Massachusetts (1926) an organism, which is identical in description with *Streptobacillus*

moniliformus, was reported to have been present in ten out of twelve blood cultures. No serologic tests were taken in these cases, however.[5a]

Murrel states that rat bite fever, although positively associated with other organisms than the spirilla, is invariably negative in regards to false-positive reactions,[5a] whereas Davis concludes that reactions are quite frequently positive with *Streptobacillus moniliformus*.

From the above, it will be seen that no conclusions are possible, either as to exact etiology of rat bite fever, or concerning the occurrence of false-positive reactions.

Relapsing Fever: This is a very rare disease in the United States. One case has been reported in the United States, in which an undoubted relationship existed between a positive Wassermann reaction and an injection with *Spirochaeta novyi*. No evidence of syphilis was present, and the blood Wassermann returned to normal within a one month period. The infection was treated with three doses of mapharsen, and with each blood serology there was a gradual disappearance of the positive reaction. In the discussion of the above article, it was pointed out that in California there is an endemic infection of chipmunks with the spirochete of Obermeier, which is transmitted to the human being by the bite of a tiny tick and which produces relasping fever. Transient positive Wassermann reactions have been noted with this disease.[6a]

Pai has reported that seven of fourteen cases had a postitive Wassermann reaction which became negative after treatment with only small doses of arsenicals.[4]

Although in the above reports small doses of arsenicals were used for treatment of the disease, it appears that this disease rather frequently produces false-positive Wassermann reactions.

Disseminated Lupus Erythematosus: Coburn and Moore have reported 30 cases of this disease in which 11 patients had positive Wassermann reactions and 13 had positive Kline tests, without history or clinical evidence of syphilis. The Wassermann reactions fluctuated from anti-complementary to positive or negative and the Kline tests from four plus to zero, irrespective of the presence or absence of pyrexia. Eight patients had four plus or anti-complementary Wassermann reactions and all of these sera gave four plus Kline tests. Three had one plus to four plus Wassermann reactions with positive Kline tests.

Tests were performed concerning temperature increases on syphilitic and lupus serums. It was found that lupus sera, which originally gave a weaker reaction than syphilitic serum, became more strongly positive as the temperature was raised (strongest at 62° C.). This suggested that in addition to the differences in quantity of antibody there was a qualitative difference between the antibodies of syphilitic and lupus serums.

Globulin fractions, separated electrophoretically were tested for activity with the Wassermann and Kline antigens. The nitrogen content of the samples to be tested was determined and protein solutions of approximately equal nitrogen values were used. The antibody was found to be mostly in the gamma fraction and partly in the beta fraction, indicating that it migrated with a motility between that of the beta and gamma globulin.[7a]

Measles and Scarlet Fever: It is reported by Pockels that in 10 out of 134 cases of measles either positive Wassermann reactions or positive Meinicke turbidity tests were obtained. The blood was taken between the sixth and thirteenth day of the disease. On repitition of the tests several days later, a negative result was usually obtained.[13]

Another series is reported by Lane who found that in 56 cases of measles eight had strongly positive Kahn tests. These positive cases appeared within the first three weeks of the disease. Five of the cases tested at a later date were found to be negative, without receiving antisyphilitic therapy.[4]

Other authors have not reported any false biologic reaction in their studies, although it seems likely that if patients with the disease were tested at frequent intervals

during the course of the disease that a more definite conclusion could be arrived at.

Scarlet fever in the earlier literature was reported as being a frequent cause of false-positive Wassermann reactions, but in the last decade there have not been any reports of cases adequately followed. In a personal communication to Davis by Lund,[4] it was stated that patients with scarlet fever had the same level of "natural Wassermann antibody" as the normal population.

Definite conclusions concerning the above diseases can only be hoped for if large series of cases are followed.

Pneumonia and Other Respiratory Infections: Shifting Wassermann reactions are reported in a series of 52 cases of a typical bronchopneumonia although no exact clinical follow-up was done in these cases, nor was the number of cases in which this occurred reported.[8a]

Mention is made in a report by Bridgeman[2] of one case of pneumonia and bronchiectasis in which false-positive reaction occurred. Another report[12] found four cases of pneumonia in which positive serology returned to negative after subsidence of acute infection.

European writers have repeatedly, in the last decade, made mention of the fact that false-positive Wassermann reactions occur with some frequency with respiratory infections.

Hegglin in 1941 reported 19 cases in adults of an atypical pneumonia with repeated strongly positive Wassermann reactions which became negative within a few weeks. He suggested a new disease entity "Wassermann positive pulmonary infection" since positive tests were found to occur uniformly in cases with this type of patchy, soft pulmonary infiltration, whereas in 680 cases of typical pneumonia and bronchopneumonia only 2.8 per cent had transient weak reactions to one or another tests. He made no attempt to relate these atypical cases to "virus" of variety "x" pneumonia.[4]

Three cases of sore throat are reported by Mohr, et al., but unfortunately two cases were not seen at the time of acute infection, and did not have tests for heterophile antibody done at this time. Both of these may have had some type of sore throat other than that associated with infectious mononucleosis.[12]

Two American reports[4] emphasize that false-positive biologic Wassermann reactions occur in a large proportion of patients with only mild infections.

It can be seen from the above that atypical pneumonia may be a frequent cause of these reactions, but no satisfactory conclusion as yet can be drawn concerning other less clearly defined respiratory infections.

Miscellaneous Infections: Lymphogranuloma inguinale has recently been reported to produce false-positive biologic reactions, with their disappearance after treatment of the disease without antisyphilitic therapy. It is suggested by Cardon[3] that hyperprotenemia, which is frequently associated with this disease, may be the factor producing these reactions.

Other diseases such as typhus, typhoid, mumps, and chicken pox are occasionally in the literature, but no definite information is available concerning these conditions. Weil's disease, Vincent's angina, diphtheria, glanders, rheumatic fever, infectious hepatitis, chancroid fall into the same category.

Four cases of acute suppurative otitis media, one case of streptococcus septicemia, one of cellulitis and furuncle, one acute appendicitis, and one paratyphoid A, have been reported to have given transient false-positive Wassermann reactions.[2]

Subacute bacterial endocarditis was frequently mentioned in earlier reports as a cause of false-positive reactions, but no recent adequate report is obtainable.

Non-Infectious Conditions: Hyperglobulinemia has been previously mentioned as a possible cause, although infrequent, of positive reactions. This condition is believed by some to be merely a reaction of an ununderlying injection process, and is not regarded as an actual cause of false-positive reactions.

One case of gastrointestinal allergy is re-

ported as giving rise to false reactions, as is occasionally pernicious anemia, severe jaundice, and leukemia xanthomatosis.[18]

Menstruation, pregnancy, malignancy, diabetes, acetic acid poisoning, ether anesthesia, and sulfanilamide administration, have occasionally been reported but do not fit into our modern knowledge of antigen antibody reaction, and have no recent confirmation.[4]

It is to be remembered that at times excess bacterial growth in serum, excess fat and digestive products, and high barometric pressures may produce transient false, although not biologic, reactions.[18]

Spinal Fluid Wassermann: According to Davis, there is no clearer evidence today of the production of false-positive reactions in spinal fluid, although it is concluded by Scott in a controlled study that false-positive reactions occurred in seven cases of meningitis—three tuberculous, two meningococcal and two asceptic lymphocytic. He points out that false-positive reactions may occur in non-syphilitic patients during the course of pyogenic, aseptic or tuberculous meningitis, and that the diagnosis of neurosyphilis based on a positive spinal Wassermann reaction alone is unjustified in patients suffering from meningitis and other acute intracranial disorders until repeated examinations, performed after the processes have subsided, demonstrate the continued presence of reagin.[17]

APPROACH TO PROBLEM

Davis[4] points out that the most promising and rational approach to the detection of delicate differences between immunologically cross-reacting antibodies would involve immunological methods. These would include: (1) purification of the antigen obtained from mammalian tissue (beef heart); (2) testing for entirely different antibodies produced in syphilis, such as (a) antibodies of the Donath-Landsteiner type, (b) protective antibodies, and (c) antibodies reacting with spirochetes immunologically as close as possible to the true virulent *Treponema pallidum*, and (3) dissociation of antibody from floccules, on the supposition that certain false-positive serums react by virtue of physico-chemical abnormalities not involving dissociable antibodies.

The above is presented mainly to emphasize the complexity of the problem as it now exists, and to point out the definite need for future work in such a vast public health, as well as individual, problem.

METHOD OF APPROACH TO CLINICAL STUDY OF FALSE BIOLOGIC WASSERMANN REACTIONS

(1) Take careful history in reference to syphilitic infection, and do thorough physical examination, including complete dermatologic examination.

(2) Take careful history as to: (a) symptoms of some intercurrent infections of whatever nature; (b) serum treatment or immunizations; (c) vaccinations within four months preceding the questionable serologic tests.

(3) Perform a careful physical examination for evidence of acute infection preceding the questionable serologic tests, with special reference to lungs, spleen, and lymph nodes. The lymph node enlargement of infectious mononucleosis may persist for several weeks after the acute infection subsides, as also may basilar remains of an acute infection of the upper respiratory tract.

(4) A thorough search for malarial parasites, preferably by thick blood film technic, as this is a very important source of biologic false-positive Wassermann reactions.

(5) Make a blood smear examination for infectious mononucleosis. Abnormal cells of the lymphocytic series are especially important. The cytologic abnormalities of infectious mononucleosis tend to disappear promptly with subsidence of symptoms of the acute illness, and the smear may be normal at a time when the false-positive serologic tests persist.

(6) Do a heterophile antibody (Paul-Bunnell) test. This is fairly specific for infectious mononucleosis, and the antibody tends to persist in the blood for from four to five months after the onset of acute symptoms of illness and gradually disappear. The disappearance of the positive

serologic tests for syphilis does not necessarily parallel the disappearance of the heterophile antibody, and may be brief, or may persist for as long as three to four months after recovery from the illness.

(7) Determination of the sedimentation rate. This is considerably increased in early syphilis and in neurosyphilis; it may be normal or slightly increased in late or latent syphilis. It is also greatly increased in infectious processes. In the latter it will usually fall to normal as the infection subsides, whereas in syphilis will usually remain elevated.

(8) Perform various serologic tests repeatedly. Repeated strongly positive (four plus) quantitative tests are rarely found in the absence of syphilis. It has been pointed out that highly sensitive flocculation tests or precipation tests should not be used alone or as a screening procedure unless one wishes to have a harvest of non-specific reactions. When several technics are used the physician will be justified in suspecting as false positive results which are paradoxically negative, with more sensitive and positive with less sensitive technics.

Also serologic tests should be repeated in several different laboratories of known excellence in order to rule out technical error. Tests which are positive in one laboratory and negative in all others, should be suspected as false-positive.

(9) Perform Kahn verification tests, and if possible the complement fixation test with Reiter or Kazan strain *Treponema pallidum.*

(10) Test patient's serum with entirely non-specific antigens. Certain persons apparently possess the peculiar property of reacting positively to all complement fixation tests.

(11) Serologic follow-up should be prolonged; frequent quantitative serologic examinations should be done. False-positive tests tend spontaneously to fall in titer. Those due to syphilis tend to remain unchanged or to rise. Members of the patient's family should also be examnied, and sexual contacts as well, if possible.

A positive serologic test is not an emergency, except in the case of pregnancy. Although the results of treatment are best in early cases, delay of a few months in a case of latent syphilis is not likely to affect the outcome appreciably. Three months is a reasonable deadline for false tests to return to normal, and may be used by the civilian practitioner before antisyphilitic therapy is begun.

(12) Cerebrospinal fluid may be examined if a decision cannot be reached. When there is genuine reason for believing that the positive result in false, do not adopt spinal puncture as the first step in the investigation, since often a clear cut explanation can be found for the supposed false-positive result. Unless the reason for false-positivity is obvious, however, the patient should not be dismissed without a study of the spinal fluid, lest asymptomatic neurosyphilis be missed, with subsequent tragic results.

(13) Always suspect false-positive result if: (1) tests are weakly positive or doubtful; (2) a conflict between precipitation tests and complement fixation tests; (3) a repetition is positive, but titer remains low or is extremely fluctuant, (4) or if there is a decline of a titer to negative on weekly tests from one to three months without treatment.

CONCLUSIONS

Biologic false-positive serologic tests for syphilis are of definite interest to the physician. Numerous conditions have been reported to cause such reactions, although at present there is no satisfactory explanation for the occurrence, nor is there any exact agreement on the percentage of these reactions in various diseases. Nevertheless, the conditions mentioned above must be in the mind of physicians, so as to avoid an erroneous diagnosis of syphilis, and to place on his patient a tag which is of so great a social, as well as psychologic, trauma.

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BED REST IN HEART DISEASE*

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Without a doubt, the most commonly used therapeutic principle in modern medicine today, is bed rest. It is used by the layman as well as the physician as the fundamental basis in the treatment of anything from a minor to a major pathologic condition. In spite of its common usage, there has been very little scientific investigation of its effects and the extent to which the period of inactivity should be continued depends on individual subjective medical opinions, which are for the most part, empirical.

Hoff[15] stated in 1944, "the re-examination of established principles often proves to be as effective a means of progress as explanation of new fields. This is especially likely to occur in those instances where the weight of long tradition or great authority and the superficial appearance of reasonableness have combined to discourage the critical analysis of a doctrine."

Because of the urgent need for hospital space and nursing care in the last few years, the problem of bed rest has been forced on the medical profession. It first received the attention of the surgeons and obstetricians who found that the length of bed rest could be diminished markedly without any apparent harm to their results. This has caused it to become a much discussed problem in every field of medicine including cardiology. Although bed rest is considered by most present day authors as one of the most fundamental principles in the treatment of heart disease, this has not always been the case. In fact, its value was not even mentioned until the latter part of the nineteenth century.

HISTORICAL REVIEW

Most of the authorities on heart disease in the nineteenth century believed that the

*Awarded the Querens-Rives-Shore Award for the best thesis on cardiology given to a student at Tulane University School of Medicine.

cardiac muscle reacted in the same manner as skeletal muscle to exercise or rest.[7,27] Thus, they thought that the logical therapy for myocardial insufficiency was exercise, which would strengthen the cardiac muscle and thereby produce a heart which was better able to supply its demands. By the same reasoning, rest would cause fatty degeneration of the heart muscle and thus decrease its ability to do its work. In 1945, Stokes[7] warned the profession against this latter danger and stated that any patient with heart disease must learn to give up the luxurious habits of life.

Exercise was used even in cases of severe failure or acute myocarditis. In 1876 Schroetter[27] said in speaking of acute myocarditis that the chief indication would naturally be, as in inflammation of any other organ, to put the patient in a complete state of rest, but such a measure would be dangerous as it "would only tend to increase the great source of danger in the disease, viz., weakness of the heart."

Austin Flint[7] wrote, in 1886, that patients with heart disease exchanging the habits of activity for complete rest are likely to become rapidly worse.

In the eighties, the Pertel treatment of graduated periods of exercise in the form of mountain climbing became exceedingly popular and was used by nearly every authority on heart disease. The Nauheim baths introduced a few years later were based on similar principles and consisted of carbon dioxide steam baths with passive massage followed by graduated periods of exercise.

Davis[7] states that the first comment on the bad effects of exercise in heart disease was made by Corvisart in 1812, and credits Hope (1839) and Bamberger (1857), as being the first to emphasize the importance of rest. Pratt,[27] however, could find no writer prior to 1872 who recognized the value of rest, and credits its introduction to Fothergill, Gibson and Balfour. In 1872 Fothergill published the first edition of his book on "The Heart and Its Diseases" in which he states that "perfect rest, especially in bed for a time, combined with proper remedies, will give relief in every case of mere failure of the muscular structure of the heart, not complicated by valvular disease."

Gibson[27] presented an article in 1877 comparing the effects of rest and exercise in rheumatic fever. His cases covered a period of 26 years and clearly showed the valve of rest on the heart. However, he did not seem to recognize the great significance of his findings as far as the heart was concerned and it remained for Fothergill to do this in the second edition of his book in 1878. In spite of this Pratt[27] states that Balfour's book which appeared in 1876 indicated that he had a much clearer conception of the value of rest, and he may have been the first really to teach and emphasize this point. Balfour[27] says "You must never forget to insist upon rest as the most important part of the treatment of heart disease, a rest which must be more perfect and complete, the more serious the cardiac disturbance is." The true significance of this statement can only be realized if one keeps in mind that it was made at a time when most men were advocating exercise as a treatment of heart disease and warning against the dangers of rest.

Broadbent,[7] in 1898 was the first to state a definite period which bed rest should be continued. He said, "Rest is in many cases an important part of the treatment and when the state of the patient demands it, rest in bed is of the greatest service; but one of the questions calling for the greatest exercise of judgment is to decide when absolute rest is necessary. There are circumstances in which a month or six weeks in bed will prolong life for as many years. Even when severe symptoms are present, to insist upon confinement indoors is sometimes to add to the suffering of the last few months of life without adding to its duration." This same question is one aspect of the problem of bed rest applied today. In spite of his belief in bed rest in some cases, Broadbent continued to advocate the Pertel treatment in the majority of cases. Pratt[27] believes Sir William Osler was the first to write about the value of rest in this country.

He wrote "Disturbed compensation may be completely restored by rest of the body."

During the next few years most of the authorities such as Brunton, Osharner, Mackenzie and Helbut began to recognize the value of bed rest, especially during the acute stages of failure, but continued to stress the importance of exercise during convalescence. Brunton[7] advised his patients that he "would not take one beat out of the heart that could possibly be avoided." Mackenzie[7] wrote, "when exhaustion has gone so far that breathlessness or pain is easily induced and objective signs, such as dropsy, are present, rest is imperative. While other remedies may be necessary, rest is the most potent remedy of all. When the patient is fit to go about, he should be encouraged to take exercise in the fresh air. The amount of exercise he may take will depend upon his strength and this strength may be gauged by his sensations. So long as a man who is taking exercise remains free from distress or discomfort, then exercise is doing him good."

Pratt[27] in 1920 introduced the idea that it may be possible to build up the cardiac reserve further after all the signs and symptoms of failure had disappeared by keeping the patient in bed for a longer time. He also used initial and prophylactic periods of bed rest in the treatment of angina pectoris. He discredited the logic behind the value of exercise in the treatment of heart disease on the basis of three general facts; first, that cardiac muscle is a distinct type of tissue with special functions and structure, different from skeletal muscle; secondly, that the comparison is of a healthy muscle reaction to exercise to that of a diseased muscle; and thirdly, that no amount of exercise could possibly change valvular deformities, reduce blood pressure or decrease the amount of coronary sclerosis, the factors involved in most cases of cardiac disease.

PRESENT CONCEPT OF BED REST

At the present time, bed rest is generally accepted as one of the most important parts of the treatment of heart disease. However, that is as far as the agreement goes. How long should the patient be put to bed? What amount of activity should be allowed in connection with bed rest? What position in bed should the patient be allowed to assume? Should the patient be allowed to sit up in a chair? These are a few of the questions for which there are as many answers as there are men writing on the subject.

In active rheumatic heart disease there is probably more agreement as far as bed rest is concerned than in any other clinical form of heart disease. As pointed out earlier in this paper, this was probably the first type of heart disease in which bed rest was proved of value in both the prevention and cure. Paul White[41] states, "In acute rheumatic heart disease, the most important therapy is complete rest in bed. The patient should not be allowed out of bed until the signs of acute infection have completely subsided, even if it takes months or a year or two." This same view is taken by nearly every authority. Sprague[30] gives the signs upon which the decision concerning the lack of activity of the disease are concerned as:

1. Absence of fever for two weeks.
2. Normal white blood count and sedimentation rate.
3. Evidence of congestive failure gone.
4. P-R interval normal.
5. No subcutaneous nodules.
6. No chorea.
7. The patient has no respiratory infection within three weeks which might serve as a reactivating episode. Levine[17] points out that this condition may persist showing only slight evidence of activity for a long period of time. In such cases the question arises whether the decrease in heart damage will be in proportion to the length of bed rest. In such cases social, economic and other factors unrelated to the disease condition itself, must enter into one's decision concerning prolonged bed rest.

It is important to realize that because of the relative youth of these patients, many of the disadvantages and dangers of prolonged bed rest which will be discussed later in this paper apply to only a small percent-

age of this group. For this reason acute rheumatic heart disease has received little attention in the recent discussions concerning bed rest in heart disease. The problems of bed rest inactivities in bacterial endocarditis are practically the same as those for active rheumatic heart disease. Likewise the agreement is the same that absolute bed rest should be maintained until all signs of activity are gone. Those conditions given by Sprague as signs of lack of activity in rheumatic fever may also be applied to this condition. Of course, in addition to those signs the blood cultures should be negative.

Bed rest has been used as the treatment of some cases of angina pectoris. Hoyle and Evans[16] reported a series of 23 average cases of angina pectoris which they treated with a period of one month or more of complete bed rest. Seventeen of their cases showed subsequent improvement, seven showing great and ten showing slight improvement. The effect seemed to last for four to nine months following return to the pre-rest activities and decreased the severity of the attacks more than the frequency. From the results, they recommended a period of complete bed rest for two to six weeks in patients who have not improved or are becoming worse in spite of treatment. They state that those patients with pain of recent onset, and those with hypertension are most likely to benefit from this.

Wayne and Laplace[38] conducted a careful study on the effect of rest and various drugs on five cases of angina pectoris and "were surprised that the improvement was so slight following rest." Two patients whose condition was of recent onset benefitted most.

Of interest along this same line, are the findings of Harrison.[14] He found that 14.2 per cent of his patients with angina pectoris gave a history of anginal attacks occurring while they were resting in the recumbent position, whereas none reported the onset of pain to occur while resting in the sitting position. Electrocardiographic tracings taken during an anginal attack brought on by recumbency showed typical changes of angina pectoris. These findings would seem to indicate that the coronary blood supply is lower in proportion to the demand in the recumbent position than it is in the sitting or upright position. Harrison[13] concludes that rest in bed for more than a day or two has no place in the treatment of angina pectoris except in those patients who are especially liable to develop in the immediate future myocardial infarction, as indicated by increasingly frequent and prolonged attacks at rest.

In the acute stage of congestive heart failure, nearly everyone believes that absolute rest in the position of choice is essential. If the dyspnea is severe it would be practically useless for anyone to insist on anything besides absolute rest because the symptoms themselves limit the amount of activity possible. These same symptoms force practically every patient to remain in the sitting position whether it is in bed or in a chair. Once the acute attack has begun to subside, the problem is the same as that encountered in cases of mild or chronic congestive failure.

It is in those cases of mild or chronic congestive failure where almost every writer has his own "pet" theories concerning bed rest.

Patrick[24] states that rest in bed is the most important part of treatment in cardiac failure. He claims that getting out of bed to sit up for breathlessness only strains the heart further and increases the dyspnea. Therefore, one should keep a patient confined to bed in the recumbent position, even though one may have to tide him over the difficult first stage with large doses of morphine and opium. After improvement takes place and a few weeks of complete rest, the patient may be allowed up a little at a time, but for months he should spend much of his time in bed.

Davis[7] has reported one of the very few series of cases in which the effects of prolonged bed rest is compared with the effects of the more usual periods of rest. He had eleven patients who were treated with absolute bed rest for three to twelve months, according to the severity of the

failure, after all symptoms had disappeared. Following this period of initial prolonged rest, they were warned to reduce their activities below the level of activity performed before the onset of failure and also to take regular periods of prophylactic bed rest. Seven out of the 11 cases were free from evidence of congestive heart failure three or more years, and three had maintained that good health for a period of five or more years up to the time of the report. These cases were compared with 50 controlled cases treated for an average of two weeks in the hospital and then discharged with the recommendation to rest some more at home. Thirty of these patients out of 40 cases having two or more hospital admissions, returned in congestive failure within one year after the initial attack. Of these, 21 returned within six months, 15 within three months and several within two or four weeks.

From these results he concluded that many patients at the time of discharge from the hospital are in a condition of comparative failure, in spite of the absence of the usual signs. He outlined a general program which he believes should be used in the treatment of congestive failure based on the duration of failure. It is as follows:

Duration of Cardiac Failure	Therapeutic Minimum	Bed Rest Desirable	Prophylatic Bed Rest With Bathroom & Table Privileges
2 or less weeks	12 weeks	16 weeks	1 week out of 3
4 or less weeks	16 weeks	24 weeks	1 week out of 6
8 or less weeks	32 weeks	48 weeks	1 week out of 4
12 or less weeks	48 weeks	72 weeks	1 week out of 3

Strauss[21] on the other hand believes that absolute rest is rarely required or desirable except in the acute or terminal stages. He points out that absolute rest with mental perturbation may, and usually does, result in greater strain on the circulation than mild physical activity and peace of mind.

Eggleston[10] allows his patients to assume any position they prefer which is usually the sitting position to begin with. Then as dyspnea decreases he has them gradually assume a more recumbent position. They are confined to bed for at least one week after all evidences of heart failure have disappeared. He recommends a prolonged convalescence with gradually increasing activity over a period of time adequate to permit the damaged heart to regain the maximum of reserve power still left to it.

Although Powers[26] believes that absolute rest is necessary in treating a severe grade of insufficiency, he believes it should be in the position in which the patient is most comfortable. He points out that the recumbent position is not necessarily a restful one so far as the heart is concerned.

Levine[17,18,19] has been one of the foremost authorities in the warning against the dangers of recumbency in the treatment of congestive failure. He[18] believes that he has occasionally saved a patient's life by taking him out of bed and placing him in a chair. He warns that although recumbency may reduce the heart rate and blood pressure, the increase in venous flow and resulting increase in pulmonary congestion more than cancels out these effects, and the result is an increase rather than a decrease in cardiac work. Many physicians believe the disappearance of ankle edema is proof of the value of bed rest. In relation to this, Levine[19] states, "It must be borne in mind that fluid in the legs may be unsightly but does comparatively little harm, whereas fluid in the lungs is a dangerous handicap." He does not make any claim that rest is not beneficial for cases of heart failure, but he questions whether the recumbent position is the position of greatest rest. He also emphasizes the dangers of pulmonary embolism which result from prolonged bed rest. He concludes that some severely ill cardiac patients, especially those who experience paroxysmal nocturnal dyspnea should not be kept flat in bed until active cardiac treatment has been well advanced in improving the circulation. During the early days they may sit in a chair and should be urged to exercise their legs or take short walks in their room several times daily. He keeps his patients on semi-complete bed rest for one week following the disappearance of symptoms and advocates a period of gradual convalescence with reduction of activities following this. Because of the great dangers associated with

bed rest, especially if prolonged, Harrison[13] has recently stated that persons with congestive heart failure should be allowed out of bed for several hours a day as soon as severe dyspnea at rest has subsided. The other form of heart disease, of which there is a great amount of controversy as to the optimum position and the amount and degree of bed rest desirable, is coronary occlusion. As with congestive failure, most authorities agree on the treatment of the acute phase. Thus, these patients are all put on absolute bed rest which is usually in the recumbent position because of the associated shock. The other factor on which most authorities agree is that these cases must be highly individualized[44] and treated accordingly. In spite of this there are some general conclusions which most clinicians arrive at and these will be briefly given.

BED REST IN CORONARY OCCLUSION

Master[21] believes that these patients should be put on complete and absolute bed rest for a minimal period of six weeks. During this period they are not allowed to do anything for themselves which requires activity. Although he does not state that the patient should be kept in the recumbent position, most writers imply this unless specifically mentioned otherwise. This period of absolute rest is followed by a period of gradual convalescence.

In an admittedly very unscientific manner, Bradley[6] concluded that every case of coronary occlusion, no matter how severe, should have a minimum of three months of complete and absolute bed rest. He placed his patients in a bed with the head of the mattress thirty to forty inches above the foot. He believes that granting bathroom privileges tends to give the patient a false idea concerning his condition and he becomes more lax in the amount of bed rest. These conclusions were severely criticized by W. C. Blake in discussing the paper. He pointed out that no minimum could be set for all cases, but that the usual period of complete bed rest in uncomplicated cases was four to eight weeks followed by a period of gradual convalescence of six to eight weeks.

Sprague[30] also emphasizes that the period of confinement to bed is variable. He judges the progress of his patients by the temperature, pulse, blood pressure, electrocardiogram, white blood count, sedimentation rate, absence of gallop rhythm and cardiac failure and freedom from pain. He gives the shortest period of complete bed rest as three weeks, the average as six weeks, and the maximum as several months. If his patients have trouble with the use of the bed pan, they are allowed to use a bedside commode. He emphasizes that as soon as it can be tolerated, the patient should be encouraged to move his legs and feet around in order to help prevent the occurrence of pulmonary embolism.

S. M. White[42] believes that at least eight weeks of complete bed rest (position not stated) are necessary in coronary occlusion "if one is to minimize the likelihood of such crippling sequelae as aneurysm of the heart wall with its attendent rupture, intra-aneurysmal thrombosis and general interference with good function of the remaining muscle." This requirement is a minimum and is increased if there is recurring pain, signs indicating extension of the infarcted area, persistent low blood pressure or any other features suggesting delay in the firm fibrous replacement desired.

Paul D. White[41] states that most patients who die because of a coronary occlusion, do so in the first few days. A small percentage died during the second week and a very few died in the rest of the first year. He gives ventricular filbrillation as the most common cause of death in these cases, although rupture and congestive failure do kill a few. He recommends bed rest for a minimum of one month following occlusion, the first two weeks of which should be absolute. In the second month the patient should gradually be given more activity by sitting up some the first week, walking a little the second week, climbing a few stairs the third week and taking leisurely strolls outdoors the fourth week. It is preferable to have one more month of reduced activity if possible.

There has recently been a growing ten-

dency among many physicians, especially Harrison and Dock, to decrease the period of initial bed rest and also to question whether the recumbent position is the position of choice.

Harrison[13] points out two examples of myocardial infarction not treated by prolonged bed rest which are of special interest to the medical profession, namely the cases of John Hunter and Sir James Mackenzie. In 1773, John Hunter at the age of 45 years had what may possibly have been a myocardial infarction. In 1785 he began to have a series of anginal attacks and within a few weeks experienced what was undoubtedly a true myocardial infarction. From that time until his sudden death in 1793, he had numerous similar seizures induced by exercise or emotion and at his autopsy marked coronary sclerosis and two large old infarct scars were found. Although he apparently never spent any longer period in bed, he continued to be quite active during his last years and accomplished much of his best work during this time. In spite of this, he lived at least eight years and possibly twenty years after the onset of symptoms indicating serious heart disease.

Sir James Mackenzie first began to experience anginal attacks in 1907 which became more severe and probably represented infarction in 1908. He died in 1925 and during that time had several attacks of typical infarction. Autopsy showed several areas of infarction of the myocardium and marked coronary sclerosis. As far as Harrison was aware Mackenzie never went to bed for more than a few days at a time and continued to be active even to the extent of playing golf until 1923, when he was forced to quit because of exercise intolerance.

Is one to assume that these two men would have lived any longer or been any happier if they had been treated with prolonged bed rest? Although Harrison is forced to admit that no conclusions can be drawn from two isolated cases, he believed that these examples should at least lead one to adopt an open mind concerning the questionable value of prolonged bed rest.

After considering the advantages and disadvantages of prolonged bed rest Harrison[13] concluded, "Following myocardial infarction, recumbency should not be prescribed for a longer period than two to three weeks after the more acute and alarming symptoms have subsided. The recumbent position should not be enforced on patients who are more comfortable sitting. Other things being equal, it would appear wise to allow elderly patients out of bed sooner than younger ones." Dock[8,9] describes many of the dangers of prolonged bed rest which will be discussed later in this paper and arrives at much the same conclusions as Harrison.

Levine[17] states that he is inclined to endorse this view in the mild cases and prescribes greater movement of the legs in all cases than was the custom formerly. He states, "One of the most common and harmful errors in the management of acute coronary thrombosis is to outline lengthy periods of invalidism and convalescence. It generally will be found that the degree of pain will be no greater if the patient is ambulatory. What is more aimless, is to advise restricted activities, as is frequently done, confinement in bed, merely because of weakness. After the first two months, such weakness will not be helped by a program of inactivity. The entire illness, coupled with the alarming precautions taken by the physician and family, produces a state of fear, which often results in a profound neurasthenia and depression. Considerable weakness is necessarily part of the illness itself. This is further accentuated by the immobility during the early weeks in bed. To this is then added the neurasthenic state that finally may condemn the individual to a permanent useless existence."

Wolferth[44] states that one sees patients with acute coronary occlusion who continue their ordinary activities without interruption, some because they disregarded medical advice and others because the true nature of their illness had not been recognized in its early stages. Although these are obviously the comparatively mild cases, many

of them have done well, in fact, sometimes much better than after their condition was recognized and they were placed in bed.

In order better to understand the effect which bed rest has on the heart, circulation, lungs and body in general, a review of some of the physiologic principles involved is indicated. It is admitted that all of the physiologic effects have not been sufficiently investigated at the present time. In fact, most of these changes are fairly well established and have been worked out on normal subjects and therefore do not necessarily apply to pathologic conditions. However, it is believed that there is sufficient material for one to derive certain general conclusions as far as the clinical effect of bed rest in heart disease is concerned.

The principle upon which the use of rest in the treatment of heart disease is based, is the finding that the metabolic rate is decreased when the body becomes less active, which in turn results in a decrease of the work required by the heart. Since it has been shown that most organs heal more rapidly when put at rest, this is also assumed to apply to various heart conditions. As has been previously stated, nearly every present day authority agrees that rest is one of the most valuable principles in the treatment of heart disease. The problem left before us then is in what position, sitting or recumbent, is the work of the heart decreased the most? A few of the various factors which may be altered by a change in the position of the body will be discussed.

A decrease in cardiac output is generally accepted[1,3] as the fundamental change which occurs in the production of congestive heart failure. This may be caused by rapid heart action, auricular fibrillation or weakness of the myocardium. According to Best and Taylor,[3] the cardiac minute volume output is greater in the recumbent than in the erect position. This would tend, in the normal individual, to equalize any increase in venous blood flow which occurs in the recumbent position. However, Altschule[1] states that besides showing a decrease in cardiac output, patients with congestive heart failure fail to exhibit the normal response of increasing output in proportion to the rise of venous pressure or an increase in work. Thus one of the factors becomes apparent why the recumbent position often causes an increase in pulmonary congestion in persons suffering from heart failure. Altschule[1] also states that the work of the heart is directly proportional to its output. Therefore, if the diseased heart does show any increase in cardiac output upon lying down it would tend to increase the work of the heart.

Another factor which has been found to show marked change in different positions, is the blood volume. Thompson, Thompson and Dailey[34] found that in the standing position there was a loss of approximately protein-free fluid from the blood. This amounted to 11 per cent of the total plasma volume and thus resulted in a relative hemoconcentration. These findings have since been confirmed by Waterfield[37] and Perera and Berliner.[25] However, the significance of this change becomes clearer if we turn the statement around as Perera and Berliner did. Thus, a hemodilution occurs when a person changes from the standing to the recumbent position which amounts to an increase of blood volume of 10 to 15 per cent. Although it is probably not as great, a proportional change must occur when the patient changes from the sitting to the recumbent position. Perera and Berliner[25] state, "The effect of the horizontal position upon the resting individual is comparable to the administration of a slow, but sustained infusion. It seems probable, therefore, that in patients already subjected to left ventricular strain by virtue of underlying organic disease, the increase in circulating plasma volume accompanying rest in the horizontal position may prove a significant factor in inducing paroxysmal dyspnea and pulmonary edema."

Altschule[1] claims that the total blood volume is increased in all cases of congestive failure. The red blood count and hemoglobin show a corresponding increase so this may be an attempt of the body to compensate for the relative anoxemia which

occurs. In any event it would seem that the increase in blood volume would further add to the work required by the heart.

Sewall[29] found that in changing from the recumbent to the standing position there is always a rise in diastolic pressure and a fall in pulse pressure. The systolic pressure does not change materially or show a slight rise. This would cause an increase in the force against which the ventricles must work in the sitting position. Dock[9] however, has claimed this change is negligible as far as the work of the heart is concerned. From another point of view, if one remembers that the coronary flow is directly proportional to the diastolic pressure,[2] this increase in diastolic pressure may actually be beneficial in cases of coronary disease.

The pulse rate increases about twelve to fourteen beats per minute when one changes from the recumbent to the upright position according to Sewall.[29] Field and Bock[11] reported an average of only two beats per minute increase in changing from the recumbent to the sitting position. Although this would tend to increase the work of the heart, there is so little change that it is doubtful if it has any effect. Even if the change were greater, it would cause a decrease in the stroke volume at the same time, which would seem to be the important factor in the production of cardiac aneurysm or rupture following infarction.

Thompson et al.[33] and Field and Bock[11] showed the position of the body to have a direct relationship to the rate of venous flow. Field and Bock state that the venous flow in the recumbent position was 33 per cent greater than in the sitting position. Perera and Berliner[25] showed an increase in venous pressure at the auricles and in the veins of the head when a person changes from the upright to the recumbent position. Altschule[1] states that the increase in venous pressure in the respiratory centers is one of the factors causing dyspnea in the recumbent position.

McMichael and McGibbon[23] have demonstrated that in normal persons, there is a decrease in the total lung volume of over three hundred cubic centimeters and a decrease in the vital capacity of about two hundred cubic centimeters in the recumbent position. Many authorities have found a decrease in vital capacity in patients with congestive heart failure and Levine[18] believes that the difference between the recumbent and sitting position in these patients is even more marked than that which occurs in normal persons. These changes have been ascribed by Altschulte[1] as due to; (1) less effective pulmonary ventilation in the recumbent position due to shift of the diaphragm upwards and the limiting of thoracic motion; (2) changes in the amount of blood in the thorax as a result of increased pulmonary congestion; and (3) decrease in the negative intrapleural pressure.

The last factor, but far from the least, is the effect of the position on the basal metabolism rate. Best and Taylor[3] state that there is little or no difference in the basal metabolic rate taken in the sitting or recumbent position.

Although it must be reemphasized that most of the above findings were a result of study of normal persons, their significance seems great enough to allow one to conclude that the sitting position is at least as restful to the heart, if not more so, than the recumbent position. Therefore, there seems to be no indications from a physiologic standpoint for the physician to insist on the recumbent position in the treatment of heart disease, except perhaps in the early phase of myocardial infarction when there is danger of cerebral anoxia due to the shock.

There has been very little work done along experimental lines on the value of rest in the treatment of heart disease. The only two studies found by the writer were on the effect of rest following myocardial infarction and they will be summarized below.

Sutter and Davis,[28] in 1931, tied off the anterior descending branch of the left coronary artery in six dogs. One dog was given a rest period of six days following which he was forced to run an hour every third or fourth day on a treadmill at a rate of approximately three miles per hour. The other

dogs were forced to start exercise on the second or third day, some doing the same amount of exercise as the first dog and others exercising as much as every other day. They were autopsied at various lengths of time and the first dog was found to have a small, well contracted scar without thinning of the ventricle whereas the others had thin scars with aneurysmal bulging. Thus it was concluded that rest was helpful in producing better healing of the myocardium following infarction and early exercise tended to cause aneurysms.

While it is admitted that these findings show a definite trend, it is obvious that the number of subjects was insufficient to derive any definite conclusions. Also it is difficult for the writer to see any significance in their findings as far as clinical medicine is concerned. It is very doubtful if there is any physician who advocates running for one hour three days, three months or three years after an attack of coronary occlusion.

Thomas and Harrison[32] conducted some experiments on rats, in which the survival rate was studied in rats after damage was inflicted on the myocardium by burning the left ventricle. In rats whose activities were restricted to approximately 10 per cent of that of unrestricted controls, only seven survived out of 49, whereas 21 out of 47 survived in the control group. Unconfirmed rats resumed normal activity in five days as shown by their optional use of a treadmill in the cage. Forced, strenuous exercise (swimming) failed to influence mortality if it were not begun before 48 hours after cardiac trauma. From these experiments the authors concluded that physical activity within the range of tolerance may be more beneficial than complete rest. They call attention however, to the obvious fact that restraint, even though it may reduce muscular activity, can hardly be termed rest, and it is highly uncertain that the cardiovascular load under these circumstances is in any measure diminished.

Mallory, White and Salcido-Salgar[20] did some very comprehensive work on the speed of healing of the human heart following myocardial infarction. They reviewed the pathological findings in seventy-two cases of infarction in which the age of the infarct was definitely known. They found that the speed of healing is, in part, dependent on the size and position of the infarct and in part on the state of the remaining myocardial circulation, although the latter is of the least importance. Rupture of the heart was most common during the first week, occasionally occurred during the second week and was extremely weak. Small infarcts were almost completely healed in five weeks and large infarcts showed no discernable changes after eight weeks. On the basis of these findings they recommended bed rest for four weeks, only the first two of which need be absolute, followed by a period of gradual convalescence as already given by White.

The reasons why many authorities have recently advocated shorter periods of bed rest in patients with heart disease, are the marked dangers which accompany prolonged bed rest. Tillett[35] states, "The resulting total activity from bed rest created through disease, damage to functions that are otherwise normal, while at the same time permitting the damaged tissues to undergo repairs."

Dock[9] has especially emphasized the dangers of bed rest. He believes that "absolute bed rest kills more patients than anesthesia and all the drugs in the pharmacopoeia added together." He points out that man is the only mammal that lies on his back (a highly unphysiologic position) when he is ill.

Gastrointestinal changes are some of the most common problems encountered by the physician when he puts a patient to bed even for a short time. A high percentage of patients confined to their beds become constipated or distended and require regular cathartics or enemas. Many acquire cathartic habituation at this time which remains a problem to them even after they are allowed up. Although this does not in itself constitute a danger, it is obviously not desirable. Associated with this same problem is that of the bed pan. Many authorities advocate complete use of the bed pan, whereas

others believe that the straining involved in its use may be more dangerous than if the patient were allowed to get up and use a bedside commode. This question is especially significant in cases of myocardial infarction. Dock[8, 9] believes that the main danger in using the bed pan in either position is that of repeating the Valsalva experiment. Valsalva found that whenever one takes a deep breath, closes the glottis and tightens the thoracic and abdominal muscles, there follows a series of extreme fluctuations in thoracic pressure, cardiac output, blood pressure and vagal and vasomotor tone which results in a tremendous strain on the heart and circulation. Dock[9] states that after myocardial infarction, sudden death is far more likely to occur when the patient performs this effort than from any other cause, and it is a common incitant of pulmonary embolism. Unless previously warned, the patient may reproduce this experiment on the bed pan, or when trying to push himself higher on the pillows or even when passing flatus.

Urinary retention or difficulty in voiding in the recumbent position is another problem commonly encountered in (bed) patients. These patients must then be either gotten up or catheterized, with all its well-known dangers which must be resorted to. In elderly men, bed rest often precipitates severe symptoms of prostatism. It has also been found that immobility causes an increase in the rate of calcium excretion in the urine which may in turn increase the incidence of renal stones.[9]

Prolonged inactivity also causes a decrease in the vasomotor tone and atrophy of the muscles. Backache and muscle cramps often appear as a result of a long period of confinement to bed. Bed sores were probably one of the first dangers recognized as a result of bed rest. Since cardiac patients are commonly elderly and heavily sedated, this complication is especially prone to occur, unless special precautions are taken.

Pulmonary complications are probably the most important of any of the dangers of prolonged bed rest. Hypostatic pneumonia has long been recognzied as a common cause of death in chronic diseases. This is especially apt to occur in cases of cardiac failure where the lungs already show an increase in the amount of congestion. Williams and Rainey,[43] in autopsies on a large series of patients dying with congestive failure found pneumonia to be the chief cause of death in 14 per cent, and a supplemental cause in 45 per cent of the cases. The danger of the recumbent position causing a further increase in pulmonary congestion as cited by Levine[17, 18, 19] has already been discussed. Pulmonary embolism has for a long time been considered by clinicians as more or less a surgical or obstetrical complication occurring during postoperative periods. Emphasis of the condition and more widespread recognition has shown it to be common in medical cases as well. White[40] found in reviewing 370 cases of pulmonary embolism which came to autopsy that 40 per cent were postoperative, with 58 per cent infarcts, 30 per cent were cardiac with 90 per cent infarcts and the other 30 per cent were non-cardiac medical with 62 per cent infarcts. He ascribed the high degree of infarction in cardiac cases as due to the fact that the lungs of these patients were already congested and the collateral circulation was thus at a minimum.

Williams and Rainey,[43] in their series of cases of patients dying of congestive heart failure, found pulmonary embolism to be the chief cause of death in 17 per cent and a supplemental cause in 32 per cent.

Dock[9] reports that in 300 consecutive autopsies in a New York hospital, 8 per cent were found to have died as a result of pulmonary embolism. He quotes Weststahl of a San Francisco hospital as reporting 13 per cent of patients autopsied showed signs of pulmonary embolism and it was judged to be the chief cause of death in 3.5 per cent of the total cases. He states that Swiss and German pathologists have found, by complete dissection of leg veins at autopsy, that 30 per cent of all hospital cases between seventeen and ninety years of age to have thrombi in the veins of the calf and the incidence rose to 60 per cent of all adults confined to bed for more than two weeks. The

incidence rises with age, doubling at forty years, and doubling again at sixty years. Dock points out that most of these thrombi are formed in the smaller muscles of the calf and thigh as a result of pressure on these parts against the bed. Thus, they are especially common in patients under extreme sedation or in very obese patients who "lie like logs". In order to avoid this danger, he advocates a reduction of bed rest to the minimum essential and repeated movements of the legs and arms in those persons who are forced to remain in bed.

White[40] emphasizes that pulmonary embolism often closely simulates acute left ventricular failure by precipitating pulmonary edema or asthmatic breathing. It is also often difficult to differentiate from myocardial infarction. The importance of making the correct diagnosis is obvious.

Thomas and Harrison[32] believe that the incidence of ventricular fibrillation, cardiac rupture, circulatory collapse, systemic embolism and ventricular aneurysm following coronary occlusion is probably decreased by prolonged bed rest. They point out, however, that there is no evidence to indicate that these complications are more common in the sitting position than in the recumbent position. They further believe that the important factors which may be increased by prolonged bed rest are further myocardial infarction, pulmonary edema, pulmonary embolism, pneumonia and cerebral thrombosis. It is important to remember that most of those complications which are supposedly caused by bed rest occur during the first two weeks if they are going to occur at all.

The last danger which will be discussed is that of the psychologic effects of prolonged bed rest. After the individual has recovered from the acute stage of either congestive failure or myocardial infarction, there is an ever increasing desire to be out of bed. If the physician continues to urge complete bed rest for a prolonged period it would seem logical for the patient to begin to exaggerate to himself the seriousness of his physical condition. This sequence of events, all too frequently leads to a cardiac anxiety state. Harrison[13] states, "Even if we could be certain that such excessive caution would prolong life in an occasional patient, and there is no grave danger concerning this it still remains the question as to whether the objective so achieved merits the unhappiness produced in a larger group of patients by rigid restrictions."

From the foregoing presentation of bed rest and how it is used in the treatment of heart disease, it becomes obvious that one of our greatest needs in medicine today is some scientific investigation of bed rest and its various effects on the diseased human body. In spite of this, it would seem justifiable to make certain conclusions on the basis of our present clinical and experimental evidence.

1. Patients with active rheumatic fever, whether they show signs of heart disease or not should be kept on complete bed rest until at least two weeks after all signs of activity have disappeared. Rarely, in chronically active cases of long duration, the disadvantages of bed rest may outweigh the advantages.

2. Bacterial endocarditis also calls for complete bed rest until all signs of activity have been absent at least two, and perhaps a few more weeks.

3. Prolonged bed rest probably has little or no value in the treatment of angina pectoris. A possible exception to this is repeated frequent attacks of angina which may possibly be a prelude to coronary occlusion.

4. Patients in the acute stage of congestive failure should be placed at complete and absolute bed rest in the position of their choice which is almost invariably the sitting position. They should, however, be advised to move their legs frequently.

5. The physician should not be in too great a hurry to place the patient with chronic congestive failure in the recumbent position. Many of these patients may be treated just as well, during the early days, if not better, by being placed in a chair. After a certain degree of compensation has been attained, they may gradually begin to spend more time in the recumbent position.

They should be urged to exercise their legs or take short walks in their rooms several times daily. They should be kept on this semi-complete bed rest until one week after all symptoms have disappeared when they may begin a period of gradually increased activity.

6. The value of prolonged bed rest in the treatment of myocardial infarction has probably been overemphasized. Complete and absolute bed rest in the recumbent position is indicated during the initial phase of shock. Following this, bed rest in the position of choice should be continued for three or four weeks. During this period the patient should be instructed to exercise his legs regularly and may be allowed to use a bedside commode if the use of a bed pan proves to be difficult. It is very important to warn the patient against reproducing Valsalva's experiment. The use of sedatives should be kept to a minimum. Following this initial period of bed rest, a period of convalescence with gradually increasing activity extending over four to six weeks may be begun.

7. Lastly, it should be emphasized that every case of heart disease is an individual problem and the general form of therapy should be varied accordingly.

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CHECK AND DOUBLE CHECK

A statement appears in this issue of the Journal concerning a pamphlet which has been put out by the Public Relations Bureau of the Medical Society of the State of New York. This is prepared by a school teacher of Portland, Maine, Mr. J. W. Walch. We would like to comment on this pamphlet a bit in detail because we think it might be of great value to the physician to have in his office to give to his thinking patients. The pamphlet is prepared for lay groups as well as for doctors and can be readily understood by persons not necessarily physicians.

Mr. Walch asks some 133 questions, and then proceeds to answer them. From his point of view, as a layman and as a student of compulsory sickness insurance, these questions are in the nature of questions that might be asked a doctor from anybody who presents the subject of socialized medicine to a group of those who are interested in the socialization of medicine or in voluntary medical care insurance or any method of paying for medical care.

The first question starts off by refuting the oft-quoted figures that medical care in this country was inadequate because five million men were turned down for the draft. He points out, and gives figures for those who were blind and deaf; legless and armless; who were mentally deficient; with skeletal defects such as club foot, congenital dislocations, and so on. When the figures are boiled down they go to show that rather than five million having preventable diseases, who were turned down by the draft, the number actually amounts to slightly over a million and of this million there were innumerable men who were capable of being on a big league baseball team and engaging in other strenuous activities, who were classed as 4-F. The answers to the first two questions are indicative of the answers that are given throughout the book. They are based on legitimate statistics and are in part also the expression of opinion of a thoughtful individual. The last question; Mr. Walch points out that he has given deep thought to the subject because he is interested in his own health and that of his family. He feels that there are other ways to improve the medical care of the American people without having to resort to government control.

We are quite enthusiastic about this pamphlet, so much so that we are taking the liberty to suggest to the Executive Committee that at least one copy be sent to every doctor in the state.

ORGANIZATION SECTION

The Executive Committee dedicates this section to the members of the Louisiana State Medical Society, feeling that a proper discussion of salient issues will contribute to the understanding and fortification of our Society.

An informed profession should be a wise one.

IMPORTANT ANNOUNCEMENT

The proposed plan for medical service for veterans in Louisiana which was submitted to the Veterans Administration by the executive officers of our State Society has been approved and became effective December 1. Full details and schedules of fees will be sent to each member of the Society by the Veterans Administration.

PREPAYMENT PLAN RECEIVES SEAL OF ACCEPTANCE OF A.M.A.

Plan also approved for membership in Associated Medical Care Plans

The Louisiana Physicians Service Inc., received the Seal of Acceptance of the Council on Medical Service of the American Medical Association at a recent conference of the Council held in Chicago. The announcement was made by Frank Lais, Jr., Executive Director of the prepayment plan.

In addition to receiving the Seal of Acceptance the prepayment surgical and obstetrical care plan sponsored and approved by the Louisiana State Medical Society was accepted as a member of the Associated Medical Care Plans, Inc. This organization will handle the technical problems of the plan administration on a national basis and is an organization of the Plans themselves with headquarters in the Council on Medical Service's office in the A. M. A. Associated Medical Care Plans will work with the Council and will assist the Plans on such problems as reciprocity, sales training programs, standard policies for recording data and other administrative details.

Representatives from Louisiana, who attended conferences held in Chicago during the meetings of the Secretaries and House of Delegates recently, were Dr. Rhett McMahon, President of the State Society, Dr. P. T. Talbot, Secretary-Treasurer of the State Society and Mr. Frank Lais, Jr. Delegates to the A. M. A. House meetings were Dr. J. Q. Graves and Dr. M. D. Hargrove.

The Council on Medical Service of the A. M. A. reported to the House of Delegates the progress made by the voluntary prepayment medical care plans since the House meeting in Chicago in December, 1945. Seventeen plans in fifteen states were organized in 1946. This brings the total number of plans to over eighty spread out over thirty-three states, Hawaii and Puerto Rico. In addition thirteen states and the District of Columbia are in various stages of plan development, leaving only two states with no program in progress. The rapid growth in the number of plans will necessarily give impetus to the growth in enrollment. Already enrollment in many of the plans less than a year old exceeds 50,000 and several plans are approaching the 100,000 mark. In December, 1945, only two plans had over 250,000 enrollment; at present five of the plans are in this group, with one nearing the million mark and three approaching 500,000. Approximately 5,000,000 persons were enrolled in prepayment plans throughout the nation at the close of the year.

The council reported it will continue to concentrate on the over-all national picture as it pertains to voluntary prepayment medical care plans.

Regional conferences have been planned for prepayment plan executives and from all indications Louisiana may be selected as regional headquarters for meetings for the Gulf States area.

DOCTORS—THEN AND NOW BROADCAST

On Saturday, January 18, 1947, 3:00—3:30 P. M. (CST) the American Medical Association in cooperation with the Council on Medical Service of the Louisiana State Medical Society presents, through the facil-

ities of the National Broadcasting Company over WSMB, New Orleans, and other NBC stations in Louisiana, a broadcast dramatizing the life of Dr. Francois Marie Prevost. It is reported that Dr. Prevost was the first surgeon successfully to perform the Ceasarean operation in Louisiana, and as far as known, the second to accomplish this feat in the United States.

This program is part of a series of radio broadcasts tracing highlights in medical progress in the United States within the past one hundred years.

Doctors—Then and Now is a departure from the programs of recent years and offers dramatic stories from all sections of the country. It will bring to the microphone physicians from various regions who will tell up-to-the-minute news of what is being done to further medical knowledge and public health.

At the close of each dramatization the program will be switched to an NBC station in one of the designated sections. A physician who is an authority in that part of the country and who has been selected by his State Medical Society will present the picture of that area as it is today.

Speaking on the "Doctors—Now" portion of the program on January 18 will be Dr. King Rand of Alexandria to present the picture of medicine in Louisiana as it is today.

REPORT ON THE MEETING OF THE HOUSE OF DELEGATES OF THE AMERICAN MEDICAL ASSOCIATION, HELD IN CHICAGO, ILLINOIS, DECEMBER 9-11, 1946

The House of Delegates was called to order on Monday, December 9, 1946 at 10 a. m. with 167 members present. We were fortunate to have Dr. T. C. Routley, Secretary of the Canadian Medical Society to address the meeting on Monday. Dr. Routley has been a regular attendant at the meetings of the House of Delegates for a number of years. Recently he had attended the World's Health Conference in London, England. He brought a very inspiring message stressing the position that medicine or doctors must take in any future plans for world peace.

Admiral Boone reported to the House of Delegates on his recent survey of the hospital facilities and sanitary conditions in the coal mines. Apparently the different sections varied considerably in the extent and effectiveness of these measures. Generally, though, hospital facilities and sanitary conditions were not up to standard. In some places even elementary measures of control were not being enforced. Correction of these conditions obviously is the duty of all parties concerned, employees, employer and the medical profession.

There were a number of resolutions presented to the House of Delegatess. One of them was with regard to the political activities of the Surgeon General of the Public Health Department, Dr. Parran. The resolution, requesting that steps be taken to prohibit political activities on the part of the United States Public Health Services, was passed almost unanimously.

There was also introduced a resolution relative to the position of general practitioners in hospitals. It was pointed out that the present policy of permitting diplomates of the various specialty boards to dominate the staffs of hospitals was working an injustice on the other members of the profession. Of the 180,000 physicians in the United States there are approximately only 22,000 diplomates of the specialty boards. Recently the House of Delegates has established an individual section on the general practice of medicine which registered 939 members at the San Francisco meeting. The resolution as introduced and passed was to the effect that the House of Delegates of the American Medical Association suggests to the Council on Medical Education and Hospitals and directs it to further the realization of this suggestion, to wit: The requirements for approval of hospitals shall be so defined that there shall be (1) adequate protection of all doctors and their patients in obtaining hospitalization to the end that general practitioners as well as specialists shall have access to and use of hospital facilities; (2) that the cri-

terion of whether a doctor may be a member of a staff or head of a department shall be his actual ability as a doctor and not dependent on special society or board membership; (3) that the American College of Surgeons be urged to conform to these general policies in their procedures in the standardization of hospitals; (4) that the American College of Physicians be urged to support the policy.

An important consideration of the House of Delegates at this meeting was a study of the survey of the A. M. A. made by the Raymond Rich Associates. They had been engaged to make a complete survey of the departments of the A. M. A., which was quite complete and in considerable detail. The various recommendations were adopted largely as recommended, although there were some changes made at the suggestion of the Board of Trustees and the House of Delegates. It is impossible to go into this report in detail. The essential thing in their report was that the A. M. A. must by means of better publicity and public relations sell themselves to the American people. They stressed the fact that most of the worthwhile work which has been done by the A. M. A. is unknown to the average American citizen, who apparently looks upon the A. M. A. simply as a protector of the economic rights of the doctor. The A. M. A. must convince the public that it is (1) seeking the truth as honestly in the economic and social aspects of medicine as it is in the scientific; (2) must put the people first, that is, must deal first and foremost with the needs of the public and second with the welfare of the physician; (3) the performance of the A. M. A. must be adequate. This can only be accomplished by better and more satisfactory public relations under the control of an individual specializing in this work. This phase of their recommendation is at present time being put into effect.

They also felt that the A. M. A. should not hesitate to support or oppose measures detrimental to the medical welfare of the country. That the A. M. A. should approach and work with all groups interested in health matters and not assume an isolated position.

The various publications of the Association were likewise studied and recommendations as to certain changes were suggested. They stressed the fact that Hygeia offered a splendid opportunity for better public relations. Through this journal, the circulation of which should be vastly increased, the public could be informed more satisfactorily about the A. M. A.

The recommendations made and those that are now being put into force will necessitate a considerable enlargement of the force at the home office and an increased expenditure for salaries and other expenses. It was generally felt that if by this increased expenditure the work of the A.M.A. could be improved, then this money would have been well spent.

Another important item of business was a report of the committee on the proposed revision of the By-Laws. This committee reported to the House of Delegates on December 10, but since there were so many suggestions made to the committee by members of the House the committee requested that they be given more time and be allowed to report at the June meeting in Atlantic City.

The Council on Medical Service reported on the progress of voluntary prepayment plans. It was pointed out that only two states have not started on a plan. It is expected that the enrollment will reach 5,000,000 early next year and it is hoped that with more plans in effect the enrollment should increase rapidly.

The importance of the Hill Burton Law should be impressed on all doctors. State and county medical societies must take an active part in activating the provisions of this act. In that connection, it would seem wise for every state medical society to make its own survey of hospital facilities in its state so as to determine the need, rather than have this done by some lay organization.

The general plan of the meeting in Atlantic City, the Centennial Celebration, was presented. Every effort is being put

forth to make this the greatest meeting of the A. M. A. The program is being carefully prepared and is to include lectures, symposia, and panel discussions on timely topics so as to cover a wide field, thus appealing to every group. Representatives from various foreign countries are to be present. Certainly it promises to be an outstanding meeting, that we should make every effort to attend.

TRANSACTIONS OF ORLEANS PARISH MEDICAL SOCIETY

CALENDAR OF MEETINGS

Jan. 13. Installation meeting, Orleans Parish Medical Society, Jung Hotel 7:30 p. m.
Jan. 15. Clinico-pathologic Conference, Marine Hospital, 7:30 p. m.
The Orleans Society of X-ray Technicians, 7:30 p. m.
Charity Hospital Surgical Staff, 8 p. m.
Jan. 20. Hotel Dieu Staff, 8 p. m.
Jan. 21. I. C. R. R. Hospital Staff, 12:30 p. m.
Charity Hospital Medical Staff, 8 p. m.
Jan. 22. Catholic Physicians' Guild, 8 p. m.
French Hospital Staff, 8 p. m.
Jan. 23. Clinico-pathologic Conference, Touro Infirmary, 12 noon.
DePaul Sanitarium Staff, 8 p. m.
Jan. 24. L. S. U. Faculty Club, 8 p. m.
Jan. 27. Scientific meeting, Orleans Parish Medical Society, 8 p. m.
Jan. 28. Baptist Hospital Staff, 8 p. m.
Jan. 29. Clinico-pathologic Conference, Marine Hospial, 7:30 p. m.
Jan. 31. New Orleans Hospital Dispensary for Women and Children Staff, 8 p. m.
Feb. 3. Board of Directors, Orleans Parish Medical Society, 8 p. m.
Feb. 4. Orleans Parish Radiological Society, 7:30 p. m.
Eye, Ear, Nose and Throat Staff, 8 p. m.
Feb. 5. Mercy Hospital Staff, 8 p. m.
Feb. 6. Clinico-pathologic Conference, Touro Infirmary, 12 noon.
Executive Committee, Baptist Hospital Staff, 8 p. m.
Feb. 7. Ochsner Clinic Staff, 8:30 p. m.

N. J. TESSITORE, M. D.,
Secretary.

EYE, EAR, NOSE AND THROAT BUILDING FUND COMMITTEE

Dr. Lucian W. Alexander has been named the head of the medical staff committee of the $300,000 building fund campaign for the Eye, Ear, Nose and Throat Hospital of New Orleans. The new addition to the present building will be constructed at a cost of $600,000 with $300,000 already available. When Mrs. Marie Celeste Stauffer Eastwick made her will in 1936, she bequeathed $1,200,000 as an everlasting trust fund to the hospital, the income to be used for maintenance and research, particularly in the field of the curable blind—and another $300,000 for a new wing for the overcrowded hospital.

It was 57 years ago that Dr. A. W. De Roaldes with the aid of a few public spirited citizens established the first Eye, Ear, Nose and Throat Hospital in rented quarters. It was in 1908 that the first unit of the present building was erected with funds given as memorials, such as the Hippolyte Laroussini Memorial Pharmacy. Then in 1922 the hospital had again outgrown its quarters and the second addition was added, this section known as the John Dibert Memorial. Now these two buildings are entirely inadequate to meet the present needs of the hospital.

The new addition will increase the bed capacity from 85 to 130. There will be a greater number of rooms for the various clinics. Five new operating rooms, one fenestration operating room, one bronchoscopic and biplane fluoroscopic operating room will have the latest scientific equipment. More teaching rooms and four new laboratories, including one for research work will be added. The teaching program offered in cooperation with Tulane University Graduate School of Medicine will be greatly facilitated with expanded quarters and equipment including a new medical library and two operating room observation galleries. The entire hospital will be air-conditioned.

Dr. Alexander pointed out, "The bequest of $1,500,000 will be lost by the Eye, Ear, Nose and Throat Hospital unless the $300,000 is raised now to construct the new hospital addition."

NEWS ITEMS

Dr. Emile A. Bertucci, Sr., spoke on "Music in Its Relation to Medicine" at a recent meeting of the Catholic Physicians' Guild at the Notre Dame Seminary. The talk was climaxed by the presentation of percussion instruments with sound movies.

Dr. Wm. B. Clark recently returned from Guatemala where he concluded the research project on onchocerciasis that he began last year.

At a recent meeting of the Catholic Daughters of America Dr. Walter J. Otis spoke on "Safeguarding Mental Health."

Dr. Daniel J. Murphy spoke on the "Evils of Government Controlled Medicine" at the annual state conference of the Louisiana Society for Crippled Children, in New Orleans, November 30, December 1.

INTERNATIONAL COLLEGE OF SURGEONS

The following members of this Society attended the eleventh assembly and convocation of the United States Chapter of the International College of Surgeons held in Detroit, October 21-23:

Dr. C. Bellone, C. J. Brown, Ernest Celli, Joseph Cohen, J. A. Colclough, Vincente D'Ingianni, C. M. Johnson, P. A. Phillips, Felix Planche, Wm. Roeling, Theo Simon, I. Tedesco, N. J. Tessitore, Jos. Vella, and Edwin L. Zander.

Dr. Zander presented a paper, written by himself and Dr. D'Ingianni, on "Case Reports and a Review of Literature on Endometriosis as a Cause of Small Bowel Obstruction."

RADIO PROGRAMS

The radio programs conducted by this Society and the Civic Affairs Committee of the New Orleans Association of Commerce came to a close with the November 25 presentation. The time given to us by radio station WDSU has been withdrawn because of other commitments.

We thank those of you who made these programs possible.

MEDICAL TOASTMASTERS

At a recent meeting of the Medical Toastmasters Dr. J. A. Colclough was elected president.

Other officers elected were as follows: Dr. Chas. L. Cox, vice-president; Dr. L. J. O'Neil, secretary-treasurer; and Dr. John B. Gooch, sergeant-at-arms.

SEPARATED FROM MILITARY SERVICE

Dr. Rufus H. Alldredge and Dr. Harry Morris were recently separated from military service.

LOUISIANA STATE MEDICAL SOCIETY NEWS

CALENDAR

PARISH AND DISTRICT MEDICAL SOCIETY MEETINGS

Society	Date	Place
East Baton Rouge	Second Wednesday of every month	Baton Rouge
Morehouse	Second Tuesday of every month	Bastrop
Orleans	Second Monday of every month	New Orleans
Ouachita	First Thursday of very month	Monroe
Rapides	First Monday of every month	Alexandria
Sabine	First Wednesday of every month	
Second District	Third Thursday of every month	
Shreveport	First Tuesday of every month	Shreveport
Vernon	First Thursday of every month	

EIGHTH DISTRICT MEDICAL SOCIETY

The Eight District Medical Society met at the Bentley Hotel on December 12, for the purpose of electing officers for the coming year. Dr. Jack Cappel was elected President; Dr. Morris Hair, Lecompte, 1st Vice President; Dr. W. F. Couvillion, Marksville, 2nd Vice President; Dr. Herman C. Quantz, Secretary-Treasurer; Dr. J. Cappel, Delegate, Dr. R. E. Miller, Alternate.

The next meeting of the 8th District Medical Society was called for the first Monday in February at which time Dr. Masterson will present a paper on "The Rh Factor".

Herman C. Quantz, M. D.,
Secretary-Treasurer,
8th Dist. Med. Society.

THE LAFOURCHE VALLEY MEDICAL SOCIETY

A banner meeting of the Lafourche Valley Medical Society was held on December 11 in Raceland at the Rose Room of the O. S. T. Restaurant. The speakers for the evening were Dr. Edgar Hull who addressed the Society on "An Evaluation of the Electrocardiogram; Some Things to Expect and Not to Expect from the ECG." Following Dr. Hull's talk, Dr. Peter Graffagnino discussed "Office Gynecology." The annual dinner was a real feast which was apparently enjoyed by everyone.

Philip A. Robichaux, M. D.,
Secretary-Treasurer.

BI-PARISH MEDICAL SOCIETY

The Bi-Parish Medical Society met in the home of Dr. and Mrs. E. M. Toler. After an excellent dinner prepared and served by Mrs. Toler and friends the society was called to order in regular session.

Election of officers for 1947 resulted as follows:

Dr. Paul Jackson, President.
Dr. L. S. Nolan, Vice President.

Dr. E. M. Toler, Secretary-Treasury.

Dr. E. M. Toler, Delegate to the Louisiana State Medical Society.

Dr. E. M. Robards, Alternate.

Dr. C. S. Toler, Delegate to the 5th District Medical Society.

The society had as their guests, Rev. Harold D. Sadler, Vice Chairman of the Arkansas State Hospital, Drs. N. T. Hollis and A. C. Watson of the Arkansas State Hospital.

Dr. Rhett McMahon of Baton Rouge, Drs. Hollis, Watson and Alden were elected honorary members of the society.

Dr. Rhett McMahon of Baton Rouge, President of the Louisiana State Medical Society was the guest speaker of the evening. He delivered a very interesting discussion of the aims of the Louisiana State Medical Society during his tenure of office for the coming year.

A vote of thanks was extended to Dr. and Mrs. E. M. Toler for entertainment of the Bi-Parish Medical Society. The society adjourned to meet in the East Louisiana State Hospital the first Wednesday in March, 1947 at 7:30 p. m.

E. M. Toler, M. D.,
Secretary.

WEBSTER PARISH MEDICAL SOCIETY

The Webster Parish Medical Society met December 10, 1946 at the Minden Sanitarium. Supper was served and the following officers for 1947 were elected:

President: Dr. B. L. Cook.
Vice-Pres.: Dr. William R. Garrett.
Sec.-Treas.: Dr. E. S. Rogers.
Delegate: Dr. S. M. Richardson, Jr.
Alt. Delegate: Dr. T. A. Richardson.

TOURO INFIRMARY

The regular meeting of the Medical Staff of Touro Infirmary was held on Wednesday, December 11 at 8 p. m. The following program was presented: Clinico-pathologic conference by the Department of Pathology with a clinical discussion by Dr. Gilbert C. Anderson. Dr. Waldemar R. Metz presented two unusual cases of plastic surgery. Dr. Robert A. Katz gave a presentation on impending ischemic gangrene: A critique covering two years' trial with diethyl-ether, which was discussed by Dr. John DiLeo.

EXTRA RATIONS FOR PATIENTS

It has been brought to our attention that the forms for additional ration products previously sent to the "New Orleans District Medical Advisory Committee" should *now* be sent to the ration board in the patient's vicinity. By complying with the above request you will expedite the patient's receiving the additional rations and prevent the delay in mail transportation from the New Orleans District Medical Office back to the origin of the patient's request.

NATIONAL CONFERENCE ON MEDICAL SERVICE

The 20th Annual Meeting of the National Conference on Medical Service will be held at the Palmer House, Chicago, Illinois, on February 9. Registration will commence at 9:00 a. m. and the program will include discussions in the fields of national affairs, economics and medical education. All physicians are invited to attend; there is no registration fee. Dr. Cleon A. Nafe, Indianapolis, is President of the Conference and Creighton Barker, New Haven, is the Secretary.

LOUISIANA STATE UNIVERSITY SCHOOL OF MEDICINE NOTES

The following appointments to the faculty of the School of Medicine have not been previously announced in the journal. They include:

Dr. DeWitt Franklin Mullins, Jr., joined the faculty on October 3, 1946 as assistant professor of Pathology. Dr. Mullins is a graduate of Emory University, School of Medicine, and was recently released from active duty in the U. S. Army Medical Corps, where he was a member of the staff of the Army Institute of Pathology.

Dr. Florence L. Evans, who was associated with the School of Medicine, Louisiana State University, as instructor in Bacteriology, 1934-36, has been reappointed as assistant professor of Bacteriology. Dr. Evans received her Ph.D. degree at the University of Illinois in 1931 and during the past 10 years has been a member of the staff of the U. S. Public Health Service. During most of this period she has been engaged in research on leprosy.

Dr. George W. Hamlett was appointed assistant professor of Anatomy on September 1, 1946. Dr. Hamlett received his Ph.D. degree from the University of Texas in 1927 and has been associated with the University of Indiana, Harvard Medical School and the U. S. Biological Survey. His research has been in the field of embryology.

Dr. Daniel C. Darrow, professor of Pediatrics, School of Medicine, Yale University, lectured on "The Movement of Electrolytes in Relation to Body Water" at the School of Medicine on November 18.

Dr. Chapman Reynolds, associate professor of Pharmacology, gave a series of lectures at the medical schools of the University of Texas, Baylor University and the Southwestern Medical Foundation, under the auspices of the Phi Chi Endowment Corporation, during the period November 18 to 21.

SOUTHEASTERN SURGICAL CONGRESS

The Fifteenth Annual Assembly of the Southeastern Surgical Congress will be held in Louisville, Kentucky, Brown Hotel, March 10, 11, 12, 1947. The following physicians will appear on the program:

Claude S. Beck, Cleveland, Ohio; Wm. F. Rienhoff, Jr., Washington, D. C.; Gordon S. Fahrni, Winnipeg, Canada; Donald T. Imrie, Vicksburg, Miss.; Henry W. Cave, New York City; Leonard Edwards, Nashville, Tenn.; Hugh A. Gamble, Greenville, Miss.; K. M. Brinkhous, Iowa City, Iowa; J. O. Ranklin, Wheeling, W. Va.; R. B. McKnight, Charlotte, N. C.; Virgil S. Counseller, Rochester, Minn.; T. C. Davison, Atlanta, Ga.; M. A. Gilmore, Parkersburg, W. Va.; Sumner L. Koch, Chicago, Ill.; Marshall L. Michel, New Orleans, La.; Robert S. Dinsmore, Cleveland, Ohio; W. Perrin Nicolson, Jr., Atlanta, Ga.; Harry Morris, New Orleans, La.; Norman F. Miller, Ann Arbor, Mich.; Joseph Cunningham, Birmingham, Ala.; Duncan McEwan, Orlando, Fla.; Arnold S. Jackson, Madison, Wis.; John A. Martin, Montgomery, Ala.; Warren H. Cole, Chicago, Ill.; W. Milton Adams, Memphis, Tenn.; Irvin Abell, Louisville, Ky.; Elmer L. Henderson, Louisville, Ky.; A. J. Buist, Jr., Charleston, S. C.; Frank A. Hoshall, Charleston, S. C.; Joseph Stewart, Miami, Fla.; Everett I. Evans, Richmond, Va.; Thomas L. Lee, Kinston, N. C.

POSTGRADUATE COURSE—THE AMERICAN COLLEGE OF RADIOLOGY

The second annual Philadelphia postgraduate seminar in radiology will be held next spring, March 30 to April 4. The course is jointly sponsored by the Commission on Education of the American College of Radiology and the Philadelphia Roentgen Ray Society. Preliminary details have been announced by Dr. Barton R. Young, chairman of the special committee of the Philadelphia Roentgen Ray Society. Dr. Paul C. Swenson, Philadelphia, has been appointed director of lecture sessions. Dr. Calvin L. Stewart is secretary.

DIRECTORY OF CONVALESCENT HOMES

The Committee on Public Health Relations of The New York Academy of Medicine is preparing a new edition of the "Directory of Convalescent Homes in the United States," to be published by the Sturgis Fund of the Winifred Masterson Burke Relief Foundation of White Plains, New York. The last issue of this Directory was published by the Sturgis Fund in 1931 under the auspices of the Committee on Convalescent Care of the American Conference on Hospital Service and has long been out of print. The need of a new directory is recognized by all concerned.

Early in January, a questionnaire will be distributed to all recognized convalescent homes maintained by municipalities, counties or voluntary bodies. The information sought deals with the physical plant, the staff, the requirements for admission, the type of patients, therapy, and such other matters as will make the Directory a dependable guide for physicians who wish to refer their patients to institutions for convalescence. The questionnaire is so devised that it can be filled out with a minimum of effort. Convalescent homes that do not receive a questionnaire are urged to request one by writing to E. H. L. Corwin, Executive Secretary, Committee on Public Health Relations, The New York Academy of Medicine, 2 East 103rd Street, New York 29, New York.

PHARMACOPOEIA NOTES

The coming U.S.P. XIII will recognize only one iodine tincture, the two per cent, and has deleted the seven per cent solution. What was formerly called mild tincture of iodine will now be known as *iodine tincture.*

This action was taken because it is believed by physicians that the simpler preparation is not only equal to but superior to the older product as a first-aid dressing, which is the use for which iodine tincture is most frequently employed.

Pharmacists should call the attention of their customers to this U.S.P. change and explain the merits of the U.S.P. XIII iodine tincture. They should promote its use wherever possible, calling attention to the fact that the new product will not smart and sting as of old, and that in germicidal action it is equal to or superior to other first-aid preparations frequently used.

DOCTOR WANTED

The Town of Colfax, Louisiana (Grant Parish) needs the services of a general practitioner. For full particulars contact the Secretary of the State Society or the Lions Club, Colfax (Mr. C. Aswell Rhodes, Secretary-Treasurer).

A. M. A. CENTENNIAL

The American Medical Association is going to celebrate its centennial in Atlantic City, June 9-13, 1947. Elaborate plans are being made for this celebration.

Only Fellows and Invited Guests are eligible to attend. Membership in your state society is the primary qualification for Fellowship in the A. M. A. Fellowshiip dues and subscription to the J. A. M. A. are both included in one annual payment of $8.00, which is the cost of the Journal to subscribers who are not Fellows.

If you are not a Fellow and plan to attend the Atlantic City session, which will be a milestone in medical history, you can save yourself considerable time and confusion when registering, if you will write now to the American Medical Association,

535 North Dearborn Street, Chicago 10, and ask if you are eligible to become a Fellow.

SICKNESS INSURANCE

The Public Relations Bureau of the Medical Society of the State of New York has prepared a pamphlet entitled "Check and Double Check on Sickness Insurance." The subject is covered in 133 questions and answers with a complete index. This pamphlet is most comprehensive and any speaker or writer can find in a few minutes time material for a 15-minute talk. The pamphlet costs 25 cents with considerable reduction when a large number of copies are ordered. The pamphlet may be ordered from the Medical Society of the State of New York, 292 Madison Avenue, New York 17, New York.

INFECTIOUS DISEASES IN LOUISIANA

In the weekly morbidity report for the State of Louisiana for the week ending November 2, the following diseases in numbers greater than 10 were reported to the Louisiana State Department of Health: Cancer 122, unclassified pneumonia 100, tuberculosis 21, pneumococcic pneumonia 17, hookworm infestation 16 and poliomyelitis 10. The poliomyelitis cases were diffused over the state with Orleans Parish reporting three and East Baton Rouge two. For the week ending November 9, there were only three diseases reported in numbers greater than 10, namely hookworm infestation with 16, chicken pox 13, and diphtheria 12. Only four cases of poliomyelitis were reported this particular week. The drop in the cases of poliomyelitis, however, was only temporary as the succeeding week which closed November 16 showed 13 such cases reported from various parishes all over the state. Other diseases that occurred in numbers greater than 10 included pulmonary tuberculosis 39, typhus fever 18, and diphtheria 13. Practically all of the typhus fever cases were reported from Orleans Parish. The week which terminated November 23 showed the to be expected large number of cases of influenza. This week there were reported 130 cases which added to the previously reported cases for the year 1946, make influenza by far the commonest of reportable diseases, excluding venereal diseases. So far this year there have been reported over 20,000 such cases, measles coming next with slightly over 3,000 cases. Other diseases which occurred in numbers over 10 included 53 cases of pulmonary tuberculosis, 37 of septic sore throat, 29 of hookworm disease and 22 of malaria. Fifteen of these cases of malaria were known to have been contracted within Continental United States. Cold weather apparently had an effect on the incidence of poliomyelitis as only three cases were discovered in the state this week. For the week which closed November 30 there were reported a surprisingly large number of cases of cancer, 134, and of unclassified pneumonia, 112. The only disease that occurred in numbers greater than ten were influenza with 24 cases, pneumonia with 20, septic sore throat 14 and pulmonary tuberculosis 12. There were five cases of polioymelitis reported this week.

MONTHLY MORBIDITY FOR VENEREAL DISEASES STATE OF LOUISIANA

Month Ending October 31, 1946

	Total This Month	Total Previous Months	Total To Date 1946
Chancroid	29	527	556
Gonorrhea	1259	14503	15762
Granuloma inguinale	11	241	252
Lymphopathia venereum	6	91	97
Syphilis	1673	15340	17013

HEALTH IN NEW ORLEANS

The Bureau of the Census, Department of Commerce reported that for the week ending November 9 there were 137 deaths in the city of New Orleans, divided 90 white, 47 colored. Of these deaths, 24 were in children under one year of age, 14 white and ten colored. In the previous week there were reported only 118 deaths in the city and in the succeeding week which ended November 16 there were likewise comparatively few deaths, only 119 of the citizens of the city died, 73 of whom were white and 46 of whom were colored. The infant deaths numbered 14. The death rate increased the week ending November 23, there being 131 deaths in the city apportioned 94 white, 37 colored, with only 12 infant deaths. There was a further increase in the number of deaths that occurred the following week; eighteen more people died than the previous week. The 149 deaths were divided 106 white, 43 colored. Seventeen of the deaths were in children under one year of age and 14 of these were white children.

CORRESPONDENCE

December 3, 1946

Dr. P. T. Talbot, Secretary
Louisiana State Medical Society
1430 Tulane Ave.
City 13.

Dear Dr. Talbot:

On motion passed by the Second District Medical Society, we would like for you to know that we approve the Insurance Plan adopted by the Louisiana State Medical Society. This endorsement will be so reported in our minutes.

Sincerely,
Second District Medical Society,
Philip M. Tiller, Jr., M. D.
Secretary.

November 15, 1946

Louisiana State Medical Society
1430 Tulane Avenue
New Orleans, Louisiana

Attention: Dr. P. T. Talbot, Secretary

Gentlemen:

Pharmacists in the Prescription Departments of the United-Rexall Drug Company's Liggett, Owl, Sontag and Renfro Drug Stores are now under instructions to label all refillable barbiturate prescriptions as habit forming and also with the barbiturate content per unit.

We want every physician to know that the appearance of this information on any such refills of his prescriptions is not a policy initiated by our company. We do it because the Food and Drug Administration claims that the absence of such information would constitute a violation of the Federal Food, Drug and Cosmetic Act.

We foresee that such information on the label of a prescription may be disturbing to some patients and that the physician may blame our pharmacists for intruding in relations between the physician and the patient.

In order to temper the abruptness of such warnings, we are also placing the following statement on barbiturates, "Medicine of this type should be taken only for the purpose and for the length of time which your physician prescribed it."

We will appreciate it if you will acquaint your members with this fact through your publications or any other way possible. We think that this will help to accord the relations between physician and pharmacist which is one of the keystones of service to the American public.

Very truly yours,
Joseph A. Hailer,
Merchandising Manager—
Pharmaceuticals

WOMAN'S AUXILIARY

News from Auxiliaries has been very scarce lately, but surely not from lack of activity.

Several Auxiliaries have been very busy circulating publicity and making all the necessary preparations in order to have as large a crowd as possible to hear Mrs. Rex Fortenberry speak.

Mrs. Rex G. Fortenberry, attorney of Beaumont, Texas, and national lecturer, at the request of the Louisiana State Medical Society and under the sponsorship of the Auxiliaries to Louisiana State Medical Society, made a state wide tour, speaking in Monroe on November 18, in Alexandria November 19, Baton Rouge November 20, and in Hammond, November 21 at the Southeastern Louisiana College Music Auditorium, with a reception immediately following in the Social Room; in New Orleans, November 25, with a reception following in McAllister Hall of Tulane University; on Tuesday, December 10, in Lake Charles, (Little Theater), on Wednesday, December 11, at Lafayette, in Southwestern College.

Mrs. Fortenberry's subject was "Socialized Medicine—What it Would Mean to You." She became interested in the subject of the Murray-Wagner-Dingell bills "due to the fact that medical care is so vital to the people of the United States that any proposed changes in the character of the service should be carefully studied by those who will be affected," she said.

Mrs. Fortenberry practices law with her husband in Beaumont, Texas. She has a Bachelor of Law degree from the University of Texas and two Bachelor of Music degrees from Northwestern University of Chicago. She was admitted to practice in the state of Texas in 1938 and to practice in the Federal courts in 1940.

She is a member of the State Board of the Texas Federated Women's Clubs, which she serves as chairman of legislation, and is affiliated with the American Association of University Women, Altrusa, Business and Professional Women's Clubs, Pan American Round Table, Daughters of American Revolution, and Music Study Club. She serves also on the Board of Campfire Girls and the Beaumont Child and Family Counseling Bureau.

It is a great privilege and indeed a pleasure to hear such a distinguished person and one so well informed on such legislation now before Congress which if passed will force socialized medicine on the public. The Auxiliaries—privileged to have Mrs. Fortenberry have been fortunate indeed, as well as the public to whom she spoke.

The members of these Auxiliaries deserve much praise too, for the fine work they have done for they have given much of their time to work untiringly, to make their meeting a success.

It is only with this type of information given by an informed speaker, such as Mrs. Fortenberry, that the public can be informed properly as to the evils that would be experienced should socialized medicine become a certainty.

PARISH MEDICAL AUXILIARY MEETS IN PONCHATOULA WITH MRS. SCOTT

The regular monthly meeting of the Woman's Auxiliary to the Tangipahoa Parish Medical Society met Thursday of last week at the home of Mrs. Glenn T. Scott in Ponchatoula.

The members were honored by a visit from the state president, Mrs. Arthur Long, of Baton Rouge. Also present was Mrs. Roy C. Young of Covington, a past president of the state auxiliary.

After a short business session Mrs. Long spoke to the group on various phases of auxiliary projects, stressing the importance of doctors' wives doing all they can to become informed and help inform the public of the danger they will encoun-

ter if legislation is passed that will force socialized medicine on them.

Following Mrs. Long's talk the group enjoyed several musical selections on the accordion, rendered by Miss Zoe Lansing of S. L. C.

The guests were then invited into the dining room, where refreshments were served. The table was most attractive with an unusual centerpiece of miniature dining room furniture. The tiny table was set with a miniature turkey and all the trimmings, carrying out the Thanksgiving motif. This was arranged on an oval mirror and covered with a glass canopy. The centerpiece was surrounded by yellow chrysanthemums, and yellow tapers burned in crystal candelabra. Mrs. Collins Lipscomb poured tea.

This was one of the most enjoyable meetings of the year, and in attendance were Mesdames M. C. Wiginton, Arthur Long, Roy C. Young, C. D. Alessi, S. J. Cali, S. J. Dileo, A. J. Feder, Chas. Genovese, A. T. Montagnino, Glenn T. Scott, Jr., J. DeLoach Thames, Marshall M. Scarle, Collins P. Lipscomb, and Miss Zoe Lansing.

Mrs. M. C. Wiginton,
Chairman,
Committee on Publicity.

BOOK REVIEWS

Gastroenterology: By Henry L. Bockus, M. D. Philadelphia, W. B. Saunders Co. 1946. Pp. 1091. Price $12.00.

The reviewer had the opportunity thoroughly to familiarize himself with the first two volumes of Bockus' group and had looked forward eagerly to acquisition of the final volume. This third volume has lived up to the qualifications of its two earlier partners and completes the most authoritative treatise on Gastroenterology available. This remarkably thorough series completed during the difficult war years shows none of the deficiencies common to publications of this period. A careful choice of collaborators is apparent. For this third volume devoted to the liver, biliary tract and pancreas, and secondary gastrointestinal disorders there were fourteen contributors. Bockus, however, did not permit himself to become an editor, he competently fills in gaps between his fellow authors.

This work is so meticulous that for accurate evaluation it demands student-like reading rather than haphazard review. I, therefore, have been slow in giving my report that I might dedicate time to a pleasing task I assumed.

Tumen is responsible for classical sections on the anatomy and physiology of the liver, jaundice and hepatic disease. He is probably the outstanding contributor.

Berk shows excellent clinical ability in handling his portions on biliary tract disease.

I am certain many will feel more attention should have been given splenorenal shunt surgery in cirrhosis with ascites. Perhaps the author does not favor heroic surgery.

Dozzi's management, alone, and in collaboration with Bockus on the pancreatic issue is commendable.

In a period in which functional disorders of the gastrointestinal tract of neuropsychiatric origin are so prominently spoken of it is a little disappointing to find such a brief and inconclusive section as Yaskin's 29 page contribution. Yaskin is too much the neuropsychiatrist looking at gastrointestinal manifestations rather than a clinician striving toward successful therapeusis.

Miller, not an unduly enthusiastic allergist, handles his subject concisely and practically to give a fair relationship of gastrointestinal manifestations to allergic precipitants.

Stroud with Billet competently handles cardiologic aspects.

The review of this volume has been so enjoyable that one regrets not commenting on each section individually, certainly there is no deficiency encountered. However, the work is so detailed that one could write on at length without giving full credit where it rightfully belonged.

These three volumes create an excellent gastroenterology reference for specialist, student and practitioner. It is hoped the author may be able to keep the work revised annually.

GORDON MCHARDY, M. D.

The Diagnosis and Treatment of Pulmonary Tuberculosis: By Moses J. Stone, M. D. and Paul Dufault, M. D., F. A. C. P. Philadelphia, Lea & Febiger. 1946. Pp. 325. eng. Price, $3.50.

This is the third edition of a manual originally published by Hawes and Stone and deservedly lives up to the traditions of its predecessors. Because it is compact and brief, the material is presented in simple, almost dogmatic, fashion: for a manual, this is not objectionable. The twenty-six well written chapters, each with a small bibliography appended, provide an adequate survey of the current teachings on pulmonary tuberculosis. While obviously not intended for the specialist in phthisiology or for the research worker, it is suitable for the senior medical student or for the physician who wishes to review the field of tuberculosis without encountering the less "practicable"

data. The tenor of all statements made is conservative; each recommendation for diagnosis or therapy is supported by abundant clinical and experimental evidence. The illustrations are helpful. It should be as well received as were the preceding editions.

SYDNEY JACOBS, M. D.

Clinical Laboratory Diagnosis: By Samuel A. Levinson, M. S., M. D., Ph. D., and Robert P. MacFate, Ch. E., M. S., Ph. D. Philadelphia, Lea and Febiger, 1946. Pp. 971. 192 engravings and 15 plates, 7 in color. Price, $10.00.

The third edition of this valuable work merits commendation. The authors say that they have endeavored to present data "in such a manner as to afford a rapid review of the pertinent points of previous studies with an attempt to correlate the didactic subjects with clinical diagnosis". Their efforts have been successful. To this reviewer the most appealing feature of the work is the correlation of pertinent facts gleaned from the basic medical sciences with clinical symptomatology in connection with the description of each clinical laboratory procedure; because this has been accomplished, careful page-by-page perusal of the volume may be considered to represent an acceptable, albeit a brief, "refresher course" in important aspects of clinical medicine.

In general, only the preferred technic is presented in describing each important laboratory test; expensive or complicated methods of testing are not described even though degrees of accuracy which they allow may be greater than those achieved with simpler technics. There are chapters which describe clinical laboratory methods in diseases of the mouth, the stomach, the duodenum and related organs, the intestine, the kidneys; other chapters deal with metabolism, chemical analysis of the blood, hematology, immunology and serology, cerebrospinal fluid, transudates and exudates, general bacteriology, sputum, skin tests and other biological examinations, milk and water analysis, histologic technic, legal medicine and toxicology. One excellent chapter describes laboratory methods in pediatric practice. Another, introduced in this edition, describes laboratory procedures in tropical diseases. An appendix tabulates valuable data. Ninety-seven tables allow succinct treatment of especially important subject. The format of the book is pleasing.

A number of specific criticisms may be listed: (1) Pyorrhea alveolaris, the authors write, "is thought to be caused, in part at least, by the *Endamoeba gingivalis*"; no definite proof exists as to the pathogenicity of this ameba. (2) The statement "practically no absorption takes place from the stomach" is refuted by daily experience with alcohols, drugs, poisons and sugars. (3) Since so many extra-gastric organic entities produce symptomatic gastric disturbances, the validity of the statement "the clinical symptoms of a gastric disturbance together with euchlorhydria usually indicate a neurosis" is called into question. (4) On page 77 "pylorus" appears as "pyloris". (5) For "*Trichuris trichiura*", which appears several times, a more acceptable term would be "*Trichocephalus trichiurus*". (6) On page 129 "*Echinococcus granulosus*" is improperly spelled "*Echinococcus granulosis*". (7) The Weltmann reaction is described at undue length and rather remarkable claims are made for the help which it affords in differential diagnosis and prognosis. On the other hand, a most useful and widely employed technic of blood examination, the copper sulphate method for the determination of specific gravities of blood and plasma, blood proteins and hemoglobin levels, is not presented. (8) On page 494 there appear these sentences: "Anemia is a symptom, not a diagnosis. It is characterized by a decrease in the hemoglobin of the blood below the normal amount." It is realized that these statements express the views of one school of hematologists in America; the reviewer, however, prefers to align his views with another school which holds that anemia may be a disease, e.g., pernicious (Addisonian) anemia, and that changes in number and morphology of erythrocytes should be taken into account in defining anemia. (9) The plate on page 532 which depicts "filarial larvae in the blood" lacks sufficient clarity to warrant its inclusion in a work of this nature. (10) On page 625 "Coccidioides" is mispelled "Coccidiodes". (11) The propriety of classifying bartonellosis as one of the rickettsioses is indeed doubtful. (12) It is regretted that the authors have not presented data on toxoplasmosis. (13) As an acceptable name for the organism causing scrub typhus, *Rickettsia orientalis* is to be preferred to *Rickettsia tsutsugamushi*. (14) An unduly poor prognosis is inferred for cases of kala-azar, whereas with appropriate therapy it is usually good. (15) In the description of advanced cases of African sleeping sickness there appears the erroneous statement: "Lumbar puncture is negative." (16) The most important arthropod vector of Chagas' disease is listed as "*Triatoma megista*"; an accurate designation is "*Panstrongylus megistus*." (17) In the discussion of malaria no mention is made of the exo-erythrocytic stage of malaria plasmodia in man. (18) On page 790 loose structure of a sentence allows the reader to understand that a microgamete of a malaria parasite consists only of a "flagellum" whereas, like a spermatozöon, it consists of a flagellum and a nucleated body. (19) Description of technics for staining thick blood films is not clear; the technics chosen for presentation are not modern. (20) In a discussion of granuloma inguinale there appears the remarkable statement: "clinical symptoms are absent." (21) In the material upon the rickettsial diseases the Neill-Mooser reaction, which appears in laboratory animals following inoculation of ma-

terial from cases of endemic typhus fever, is not described; moreover, the valuable complement-fixation tests of the blood to differentiate the rickettsioses specifically are not presented. (22) The epochal studies of Sabin, Philip and Paul upon the leukocytes in sand-fly fever are not mentioned. (23) It is felt hat the present state of our knowledge does not warrant the unequivocal statement on page 817: "Trench fever is caused by the invasion of *Rickettsia wolhynica* into man." (24) On page 817 Oroya fever is misspelled "Oroyo" fever.

While the foregoing list of critical comments is lengthy, it is felt that the general excellence of the work is only slightly impaired by the need for their enumeration. Perhaps the reviewer may best describe this book as one which he will certainly acquire in order to have the benefit of consultation with its authors in his daily work.

In final comment on this volume special attention should be directed to the excellence of presentation of material upon the clinical laboratory study of specimens taken at biopsy from the bone marrow.

EDWIN S. KAGY, M. D.

Diseases of the Retina: By Herman Elwyn, M. D. Philadelphia, The Blakiston Co., 1946. Illus. Pp. 587. Price, $10.00.

Ophthalmology is indebted to the author for a difficult and important work well done. His presentation of the subject is less complete but simpler than that of Leber, in his two volume classic of thirty years ago. The brief case reports used to illustrate especially rare conditions, render a distinct service in making this volume easy to read. The excellent illustrations and photographs also facilitate understanding of the text. He has correctly emphasized that many degenerations are an exaggerated form of presenility, and that these follow definite patterns, in which ocular participation is often a part of a similar involvement in other parts of the body.

The classification followed materially clarifies the subject, although conflicts exist. Conditions such as essential arterial hypertension are discussed under circulatory disturbances, though they are basically constitutional degenerative diseases which are discussed in another section.

The number of summaries could have apparently been increased to advantage. A more detailed description of pathological sections would have been advisable.

The table of contents, bibliography, and index, are especially complete for a volume of less than 600 pages.

The author is to be congratulated on having made a major contribution to ophthalmology.

CHARLES A. BAHN, M. D.

Diseases of the Adrenals: By Louis J. Soffer, M. D. Philadelphia, Lea & Febiger, 1946. Pp. 304. Price, $5.50.

The author has presented in less than three hundred pages the accrued information in the anatomy, physiology and pathology of the adrenals, in addition to the clinical manifestations and management of adrenal disease.

The description of clinical syndromes is developed after an elucidation of the part these organs play in endocrine inter-relationships, electrolyte and water balance, carbohydrate and protein metabolism, the physiology of the circulation and shock.

Considerable space is given to Addison's disease, the Waterhouse-Friderichsen syndrome, the adrenogenital syndrome and neoplastic adrenal diseases. The term adrenogenital syndrome is used to include a variety of conditions which produce similar clinical states. It includes pituitary basophilism, adrenal cortical tumors and hyperplastic tumors of the anterior pituitary, arrhenoblastoma, granulosa cell tumor, thymus tumors, pineal tumors, and hyperostosis frontalis interna.

Neoplastic diseases of the adrenals and the chromofin system are discussed from a standpoint of the precurser cells of these tumors.

This book is intended for the clinician. It contains practical points in the recognition and management of adrenal diseases. Case histories, photomicrographs, and reproductions of microscopic sections illustrate the text. A section describing the technic of electrolyte determinations in serum and urine, male sex hormone and 17 ketosteroid excretion, the salt tolerance and deprivation tests, the water tolerance test and perirenal insufflation is a valuable source of reference. In addition to bringing together the present knowledge of the adrenals, the author has given frequent summaries and the benefit of his own experience in many instances. This book's patho-physiological approach to disease makes it interesting reading in a fascinating subject in medicine. The monograph meets a definite need and will undoubtedly be well received by the profession.

STANLEY COHEN, M. D.

Renal Diseases: By E. T. Bell, M. D., Philadelphia, Lea & Febiger, 1946, Pp. 1946. Price $7.00.

Dr. Bell has attempted to bridge the gap between the clinical manifestations of renal disease and their pathology by a study begun on the wards and followed to the microscopic study of kidney tissue sections. This information, collected over a period of 25 years is presented following a short resumé of normal renal anatomy and physiology.

Of particular interest are the studies in glomerular nephritis. Hemorrhagic nephritis is considered as a separate entity. These patients present hema-

turia but lack the proliferative endothelial and epithelial changes found in the proliferative type of active glomerular nephritis. When uremia develops in these patients Bell attributes it to extensive filling of the tubules with blood. The azotemia of the acute proliferative types of glomerular nephritis is ascribed to the obstruction due to endothelial proliferation of the glomerular tuft, and epithelial proliferation of the capsule (referred to as crescents). The term chronic azotemic glomerular nephritis is used to denote that phase of the disease in which hyalinization of the glomeruli, or fibrosis of the epitheliol crescents occur.

The pathogenesis of the so-called intercapillary lesion is described as due to hyalinization of the inner layers of the basement-membrane of the capillary wall. Fusion of fragments of the capillary wall ultimately lead to what appears to be an intercapillary hyaline mass. This interpretation is contrary to the opinion of other authors.

In the study of the nephroses, excellent photomicrographs demonstrate the difference between terminal basement membrane thickening of the "pure" type and the glomerular proliferation of the "mixed" type. Azotemia is shown to be related to either of these processes.

The renal lesions in diabetes, pyelonephritis, tubrenal arteriolsclerosis is presented in detail, with the conclusion that they are independent diseases that intensify each other.

The renal lesions in diabetes, pylonephritis, tubular disease, specific infections, hyperparathyroidism and gout are illustrated. Nephrolithiasis and tumors are discussed in detail.

This book is well written and profusely illustrated with photomicrographs to demonstrate points in the text.

STANLEY COHEN, M. D.

Medical Education and the Changing Order: By Raymond B. Allen, M.D., Ph. D. New York, Commonwealth Fund, 1946. Pp. 142. Price $1.50.

This monograph is as delightful to read as it is informative. Naturally Dr. Allen made no attempt to exhaust an inexhaustible subject but it is remarkable how much that is stimulating has been put into so few pages. These pages contain not only a fine philosophical analysis of the relation of medical education and medical practice to communities in general but they also contain concrete suggestions for the closer integration of medical education with general education or, perhaps, vice versa. It is, of course, not desirable that every medical school should teach in the same manner but perhaps if every medical educator in this great country could read this charming treatise, there would, at least, be a common starting point for the efforts at supplying a curriculum. The author's wide experience in medical teaching and medical school administration is evident in every chapter and each page has been touched by the delicate hand of a literary artist.

H. W. KOSTMAYER, M. D

Peripheral Vascular Diseases: By Edgar V. Allen B.S., M.A., M.D., M.S., F.A.C.P., Nelson W. Barker, B.A., M.D., M.S., F.A.C.P., and Edgar A. Hines, Jr., M.D., B.S., M.A., M.S., F.A.C.P. Philadelphia: W. B. Saunders Co., 1946, Pp. 871. Price, $10.00.

This book is dedicated to Dr. George E. Brown and presents the observations made as well as the methods of treatment developed and advocated by the authors and Dr. Brown in the field of peripheral vascular diseases. In addition to the material presented by the principal authors the book contains subject matter prepared by eleven other contributors. From the standpoint of physiology, pathologic anatomy and diagnosis the volume is encyclopedic. The format is very good and there are many excellent illustrations as well as an abundance of pertinent references. In general, medical or conservative methods of therapy are emphasized. The surgical approaches and technics which have been found useful in the management of peripheral vascular diseases are also presented. Altogether, this book very well summarizes present day knowledge and practice in peripheral vascular diseases and is a real contribution to the field, valuable to both students and practioners.

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PUBLICATIONS RECEIVED

The Commonwealth Fund, New York: Health Insurance in the United States, by Nathan Sinia, Dr. P. H., Odin W. Anderson and Melvin L. Dollar.

Lea & Febiger, Publisher, Philadelphia: Clinical Hematology by Maxwell M. Wintrobe, M.D., Ph. D.

W. B. Saunders Company, Publisher, Philadelphia: Muscle Testing by Lucille Daniels, M.A., Marian Williams, M.A., and Catherine Worthingham, M.A.

Charles C. Thomas, Publisher: Urgent Surgery, by Julius L. Spivack, M.D., LL. D. Gastroenterology in General Practice by Louis Pelner, M.D.